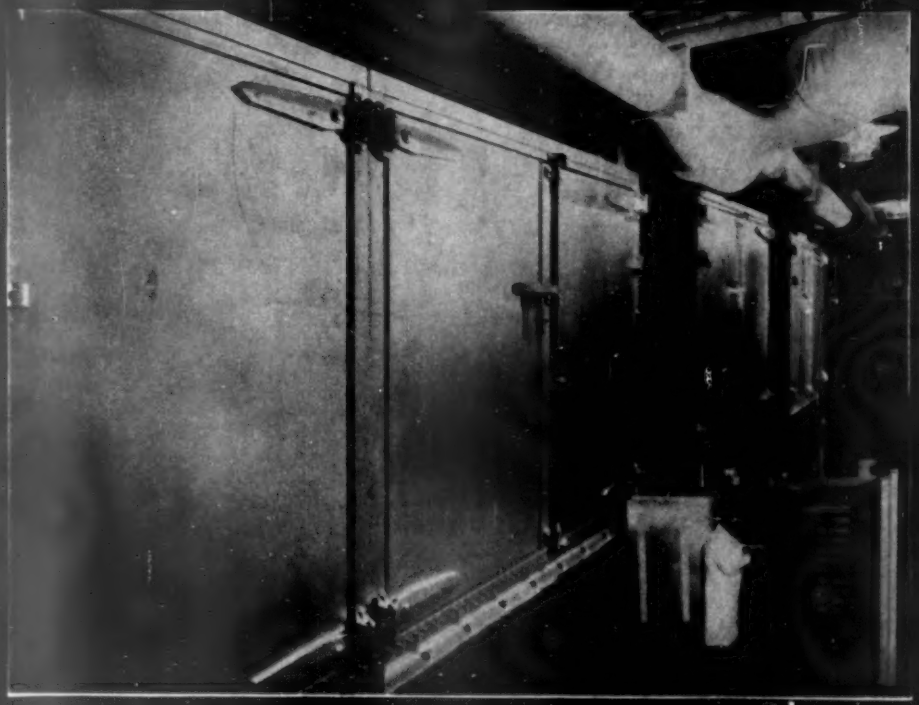
Modern Refrigeration & Air Control

Vol. 63 No. 744 MARCH, 1960 Price 2s. 6d. monthly

FASTER Freezings!



Jackstones - of course!

JACKSTONE FROSTER LIMITED GRIMSBY ENGLAND

REFRIGERATION FITTINGS—

angle valves **dehydrators** **receivers** **unions**
compressor valves **filters** **sight glasses**
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"HOOVER," "CROMPTON" and "DELCO" MOTORS
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A comprehensive supply of Equipment

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Basically the same problems are involved, problems best solved by using Spiro-Gills extended surface tubing.
Our comprehensive range of gilled tubes is used in refrigeration plant all over the world. We also supply condensers, evaporators and air coolers for use with all refrigerants. We are specialists in 'specials' too. Let us know your special requirements and we shall design and supply the equipment to meet them. Or we can build assemblies to your own design. It will save you time and money to exploit our extensive experience.
Our Technical Department is at your service. We look forward to hearing from you.

Consult SG Ltd

SPIRO-GILLS LTD. LONDON ROAD, PULBOROUGH, SUSSEX TELEPHONE: PULBOROUGH 2401/5

The "**MINIVEIL**" air curtain permits the cold store door to remain open for prolonged periods, giving completely free passage for men and goods, with a negligible rise in store temperature. No longer need you bother about the constant opening and closing of coldroom doors or the proper operating of air locks by the coldroom staff. You can rely on the protection afforded by the curtain of air provided by a "**MINIVEIL**" unit.

MINIVEIL

AIR CURTAIN UNIT

FOR OPEN COLD STORE DOORS

For efficient Cold Storage operation

The Minikay System keeps new insulation permanently dry and dries out existing wet insulation.

The Minikay System eliminates the heavy cost of re-insulation.

The Minikay System extends the life of your cold store to that of normal buildings.

Cold Storage insulation is extremely valuable—protect it with Minikay.

MINIKAY

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FOR PERMANENTLY DRY INSULATION

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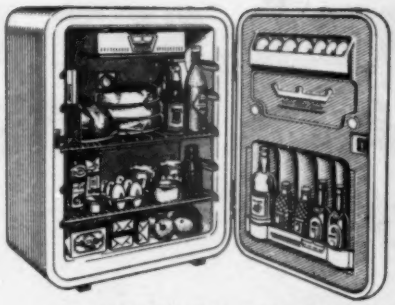
You can't beat *Leconomy*

No matter where you look, you are bound to agree that Lec Refrigerators give far more value for money. They offer all the luxury features at less than the price of an ordinary fridge. We are proud to make them—our dealers are proud to sell them.

Lec



Lec CORONET MODEL P.20

39 GNS

LIST PRICE £32.15.3.
PURCHASE TAX £6.3.9
SERVICE FEE £2.0.0.

NEW FEATURES

Door liner with moulded egg rack; moulded butter compartment; freezer door. Capacity: 2 cu. ft. Shelf area: 3.6 sq. ft. In white or cream.

External Dimensions: 27½" high, 21½" wide, 20¼" deep.
Optional extra: Contemporary steel stand with rubber feet, price 38/4.

Lec INTERNATIONAL MODEL P.60

GNS 69

LIST PRICE £58.16.8.
PURCHASE TAX £11.2.4
SERVICE FEE £2.10.0.

NEW FEATURES

Door with new smart 'square look'; new horizontal handle with push-pull action; attractive "International" motif. Door liner with moulded egg rack; moulded bottle rack; giant size door compartment for butter, fats, cheese, etc. Kick plate in rigid polythene. Freezer door in modern styling. Capacity: 6.2 cu. ft. Shelf area: 10.7 sq. ft. External dimensions: 44" high, 23½" wide, 25½" deep. In white or cream.

Lec CONTINENTAL MODEL P.8G

99 GNS

LIST PRICE £84.9.9.
PURCHASE TAX £15.19.3
SERVICE FEE £3.10.0.

NEW FEATURES

Door with attractive "gold" 'Continental' motif—"gold" Lec motif —"gold" handle. Interior with "gold" shelf and drawer cappings —"gold" door shelf rails — new contemporary style combined light-housing and thermostat knob. Capacity: 8 cu. ft. Shelf area: 14.5 sq. ft. In white or cream. External dimensions: 57⅞" high, 26½" wide, 27¼" deep. Giant freezer with plastic door holds 1,315 cu. in. of frozen food.

NEW for SPRING

Keeping up their tradition of leading the field in refrigerator design and manufacture, Lec are producing a new 4 cu. ft. domestic model to sell at 49½ gns. Unbeatable for design and construction it meets the demand for a low priced refrigerator giving extra capacity in a limited area. Ready in early Spring—but enquiries are welcomed now! External Dimensions 40" high, 23" wide, 23" deep.

SEND THIS OFF TODAY

To: Lec Refrigeration Ltd., Bognor Regis, Sussex

Please send me full details of the Lec Refrigeration range.

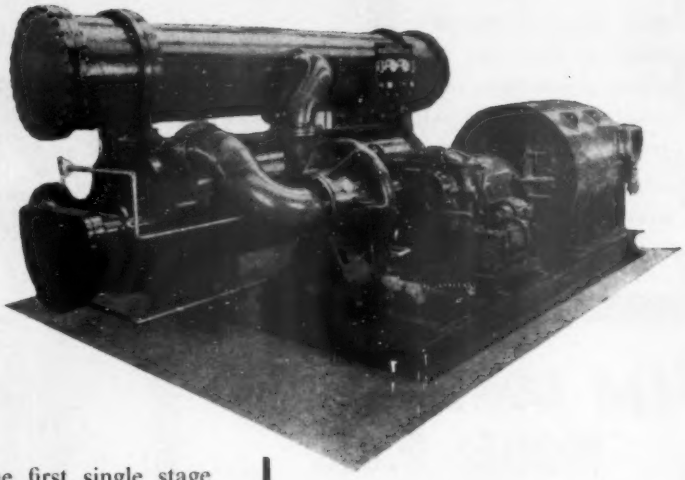
NAME_____

ADDRESS_____

_____ MR17

TURBO SET FOR AHMADI HOSPITAL KUWAIT—

and another first for YORK



What are believed to be the first single stage turbo compressor water chilling systems to be exported from Great Britain to the Middle East left recently for Kuwait Oil Company's new hospital.

Two entirely self-contained turbo packaged water cooling systems were designed, with special consideration given to the problems arising from insufficient fresh water supplies and the necessity of using sea water for cooling. Each system is rated to cool 875 gallons per minute, which represents a heat removal rate of 4.2 million B.Th.U's per hour.

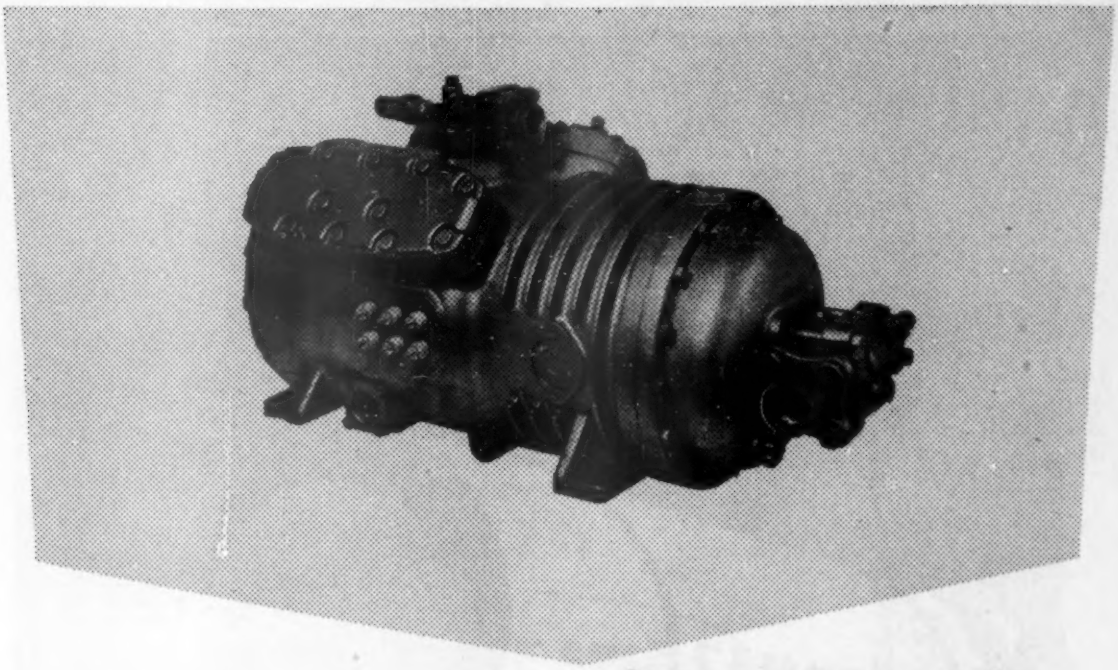
Consulting Architects and Engineers:—
HUCKLE & DURKIN,
London

Main contractors:—
BRIGHTSIDE HEATING & ENGINEERING CO. LTD.,
London

YORK SHIPLEY LIMITED

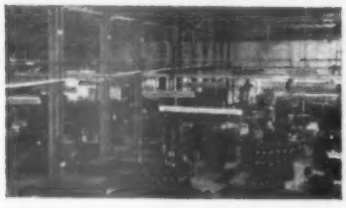
A Member of the Borg-Warner International Group

North Circular Road, London, N.W.2.



Introducing... BRUNNER-METIC

Head Office and Works at Farlington, Portsmouth

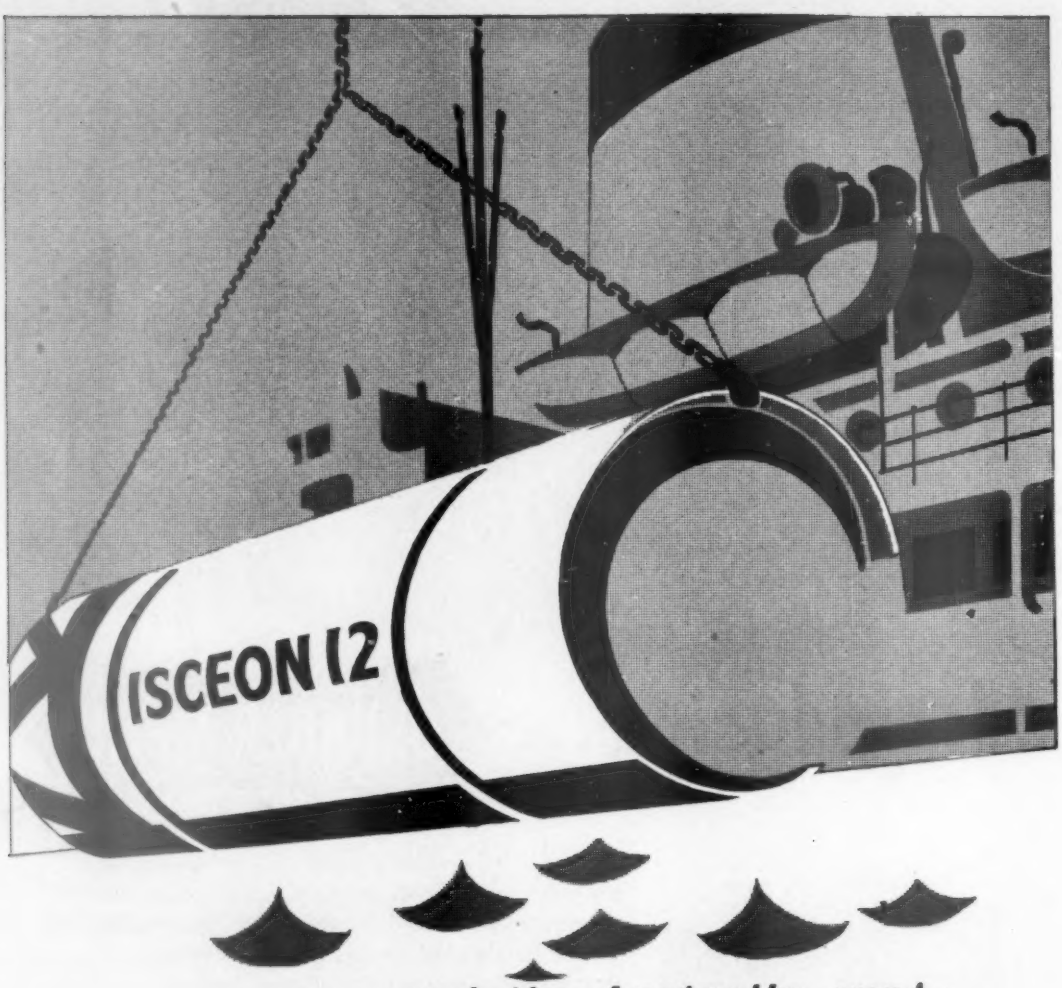


Motor Compressors . . . . . Quality, top performance and easy field servicing have made these components prominently accepted and highly regarded in the refrigeration and air conditioning industries. Brunner-Metic are the result of many years of engineering experience and background in producing the very best in compressors. Motor compressors are available ¼ through 15 h.p. Brunner-Metic motor compressors are being manufactured during 1960 at our new factory in Portsmouth.

DUNHAM-BUSH

DUNHAM-BUSH LIMITED Farlington Portsmouth Hants
Telephone: Cosham 70161-2-3-4 Telegrams: Heatamize Portsmouth

db/29



. . . and the Australia run!

Ice cold realism, deep freeze protection, they're taking abroad the guarantee of perfect refrigeration for the long journey there and back.

Any other healthy reason for selecting ISCEON 12?

Yes. It's non-inflammable, non-combustible, non-irritant and non-toxic, with the highest degree of purity.

All vital factors, all valid reasons for selecting ISCEON 12 for refrigeration ships.

A PRODUCT OF IMPERIAL SMELTING

CONSOLIDATED ZINC CORPORATION (SALES) LIMITED
37 DOVER STREET, LONDON, W.1 *HYDE PARK 8161*

THIS SHRINKING WORLD

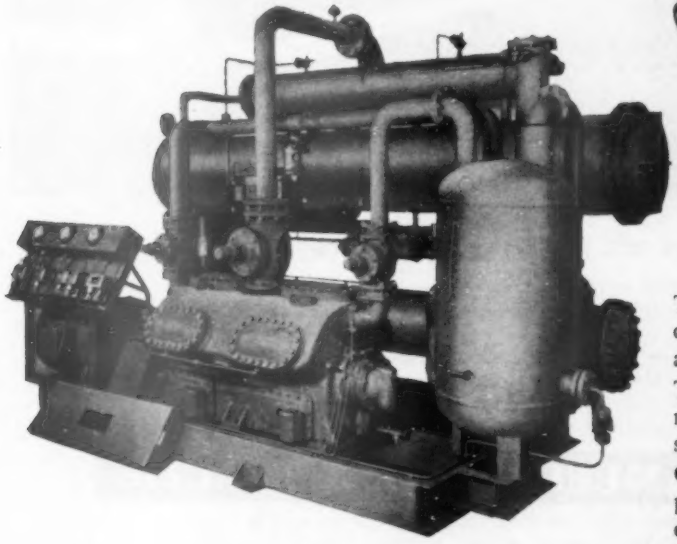
and

an **EXPANDING** organisation

Each day, improving communications diminish earth's diameter; each day increases man's knowledge and experience. Each day, logically, man needs the results of his endeavours.

For over 10 years Alfred Porter and Company have been making refrigeration plant—*its associated companies for almost a century.* The knowledge and experience thus gained is in the refrigeration plant now produced by this expanding organisation and available to you and your clients.

NO CASE for WASTE SPACE



Here illustrated is a 100 TR Water Chilling Plant. It is **factory built as a packaged unit.**

It requires just 12′ 6″ long x 6′ wide x 8′ 3″ high to house it.

The Compressor has 12 cylinders, inbuilt capacity control, balanced motion work and is precision-built.

The Condenser and Evaporator have maximum heat exchange surface in the smallest possible dimensions.

Control is reduced to the simplest possible terms, yet with every protection device embodied. It's a first-class piece of apparatus.

Further particulars from Room B2—

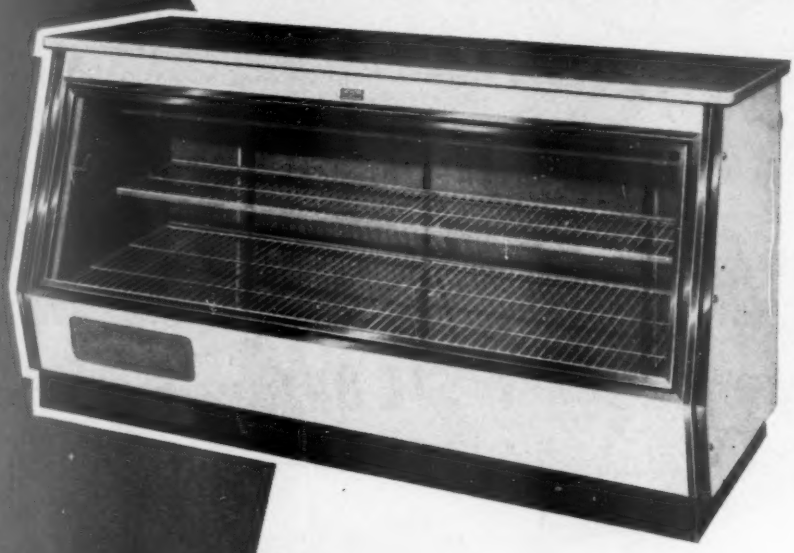
ALFRED PORTER & CO. LTD.

STELLA WORKS, ST NLEY RD., TEDDINGTON, MIDDLESEX **Teddington Lock 4406-7-8**

COMPLETE WITH SEALED UNIT

Display 3/4 VISION *Counter*

NOW FINISHED IN WHITE PLASTIC SHEETING



The ¾ vision display counter not only provides two tiers of eye-catching illuminated display, but also has ample refrigerated storage for general provisions. Where floor space is a problem, this unit will replace any normal counter without loss of valuable top surface serving area.

WHITE

J. SAMUEL WHITE & CO. LTD.

REFRIGERATION DIVISION

WORKS AND SALES
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LONDON OFFICE
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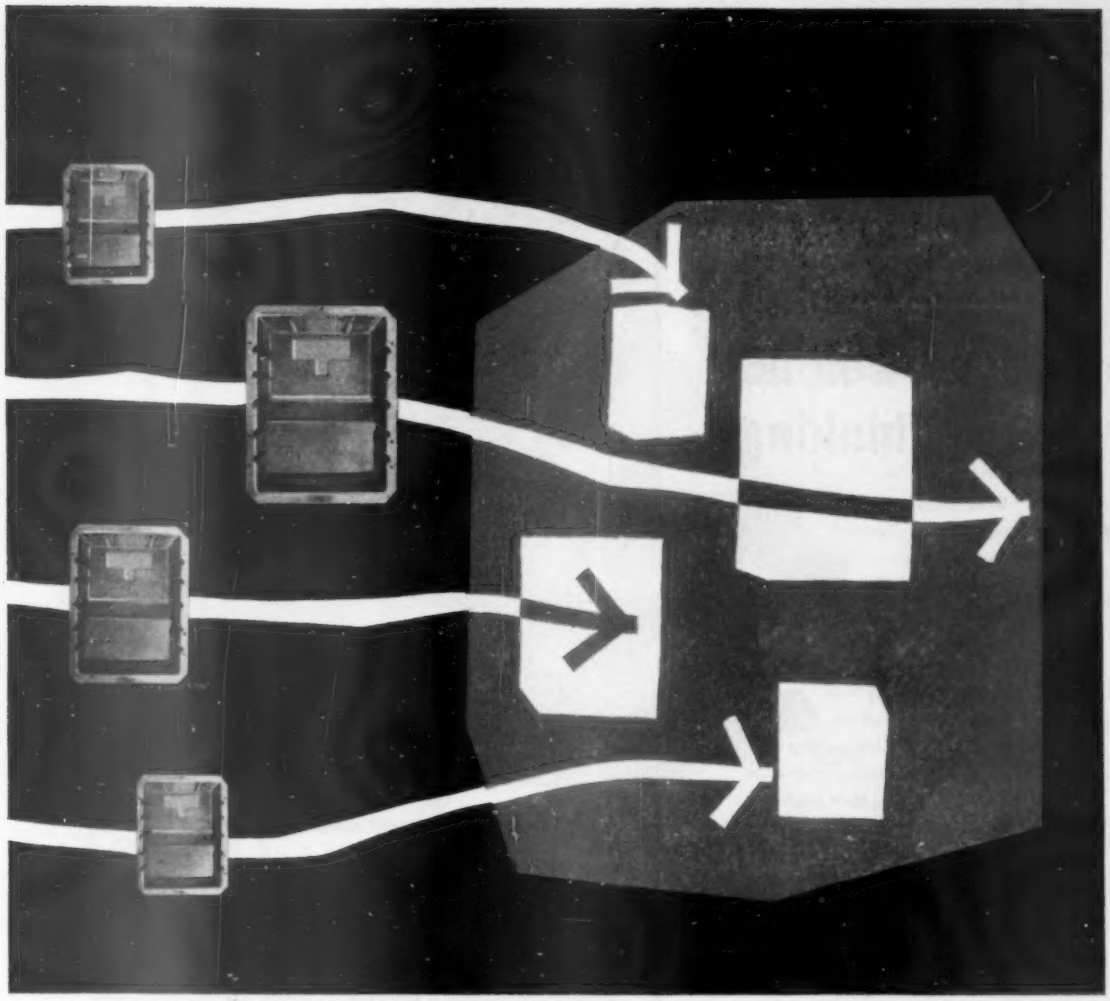


for those with designs on the market

13 million refrigerator liners are required before Britain enjoys the same standard of domestic refrigeration as America.

IRIDON are geared to meet the demand which must come. Already, two-thirds of all British refrigerators have liners of rapidly-formed Iridon H.I.P.S. With this high-impact polystyrene sheet, manufacturers find that half the work is already done.

Constant sheet thickness

Surface finish unaffected by forming

Above all, as competition becomes more intense, the low tooling costs of vacuum forming become more important. They allow rapid and economical alteration of design as fashions change.

There is a FULL COLOUR RANGE AVAILABLE. Colour change involves no waste mouldings.

Iridon

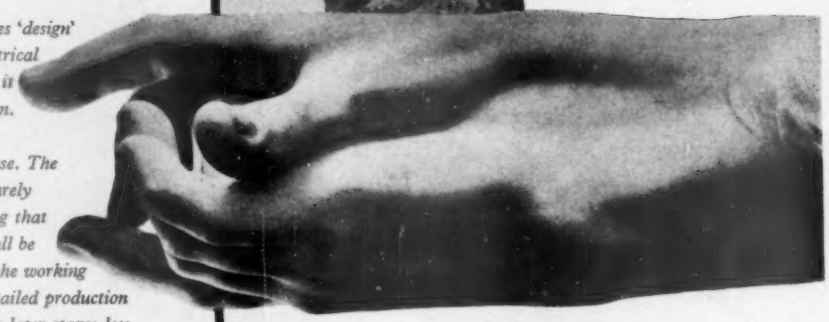
LIMITED

75 Grosvenor St · London · W1

Tel: Hyde Park 9261

Member of the **cp** group—one of the world's major producers of plastic sheet and film

It takes feeling as well as thinking...



What exactly does 'design' mean? Some electrical engineers restrict it to electrical design. But this is only the half-way house. The full sense must surely include everything that dictates what shall be made—down to the working drawings and detailed production methods. In these later stages less can be calculated, more depends on that cerebral computer, imagination which, often delivers its answers: as a direct feeling for the right job. How right in practice depends on the experience of the designer—and of the company for which he works.

Take, for instance, fractional horsepower motors...

Take our new 'T' range in particular. The electrical design was orthodox, the calculations based on accepted principles. But in constructional design, we, like everyone else, had to rely to a considerable extent on our designers' flair—their feeling for the right job. In the cooling system, for instance, we adopted a low-velocity central discharge, because we felt that the advantages of this arrangement far out-weighed any extra manufacturing difficulty.

On points like this there is almost always argument —in which the common stock of experience of the works plays a decisive part. And, having been in the game so long, the stock is large and the argument hard fought.

Crompton Parkinson
LIMITED

Member of ATOMIC POWER CONSTRUCTIONS LTD

One of the five British Nuclear Energy Groups

MAKERS OF ELECTRIC MOTORS OF ALL KINDS · INSTRUMENTS
ALTERNATORS AND GENERATORS · SWITCHGEAR
B.E.T. TRANSFORMERS · CABLES · CEILING FANS
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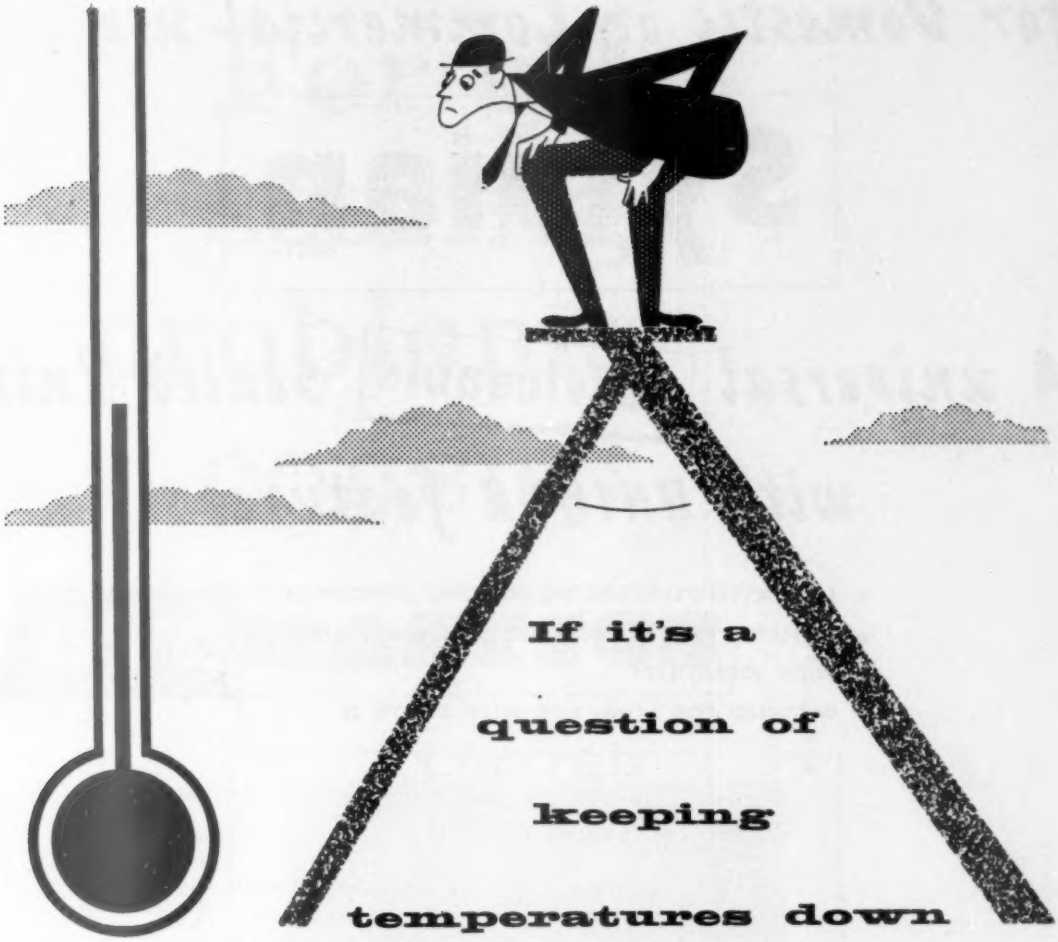
STUD WELDING EQUIPMENT · TRACTION EQUIPMENT

CROMPTON PARKINSON LIMITED, CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2



Whenever low temperature insulation is concerned, Newalls are the people to look to. They have a background of over 50 years experience in all kinds of contracts—in cold stores, in cargo and passenger ships, in breweries and creameries — in fact wherever there are refrigerated spaces.
Newalls supply *and* apply low-temperature insulation materials and their service is available through each of eight depots situated throughout the United Kingdom. When the specification calls for a first class job, call in Newalls.

Newalls

LOW-TEMPERATURE INSULATION

NEWALLS INSULATION CO. LTD. *Head Office :* WASHINGTON, CO. DURHAM.
A member of the TURNER & NEWALL ORGANISATION

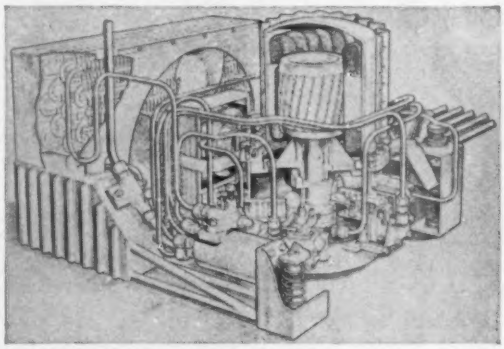
Offices and Depots at LONDON, GLASGOW, MANCHESTER, NEWCASTLE UPON TYNE, BIRMINGHAM, BELFAST, DUBLIN, BRISTOL and CARDIFF. *Agents and Vendors in most markets abroad.*

for Domestic or Commercial use

Sylvian
(REG'D)

A universal Serviceable *Sealed Unit with* UNIQUE *features*

★ LOWER TEMPERATURE MEANS REAL DEEP-FREEZE
★ OBVIATES PRE-COOLING AND SECONDARY CIRCUITS
★ WIDE VERSATILITY
★ DESIGNED FOR LONG LIFE WITH FREON 22



British Patent
UK 680922

Australian Patent
154195

U.S.A. Patent
2736122

New Zealand Patent
105246

While having the advantages of effective "Sealing" this Unit offers every facility for complete testing, maintenance or repair on the spot by ordinary Service Engineers using simple tools. Costly periods of enforced idleness are thus avoided. A special feature of the design is the interlock of main casings, giving exceptional rigidity, and long, trouble-free life.
Readily adaptable to a wide variety of mountings it provides an efficient component, as original or replacement, over a large field of operation.

SOLE MANUFACTURERS AND PATENTEES

WESTERN DETAIL MANUFACTURERS LIMITED
WESTERN WORKS, STAPLE HILL, BRISTOL, ENGLAND
Telephone : BRISTOL 65-5097 Grams and Cables : ARIES BRISTOL 652825.

For all sealing problems consult

EVOMASTICS

LIMITED

Evomastics Ltd. produce a very wide range of specialised mastics which solve an infinite number of sealing problems. Whatever your problem, be it joint movement, galvanic corrosion, temperature, solvents or just plain weather, the technical resources of Evomastics are at your service to give you the right answer. The methods of application of mastics are also an important consideration to which Evomastics give close attention and you can be sure of a quick, clean and economical job when you work to their recommendations.

THIS SPACE IS RESERVED FOR YOU

My sealing problem is . . .

POST THIS COUPON FOR FREE SAMPLE

This coupon will bring you a sample of an EVOMASTIC sealing compound for you to examine

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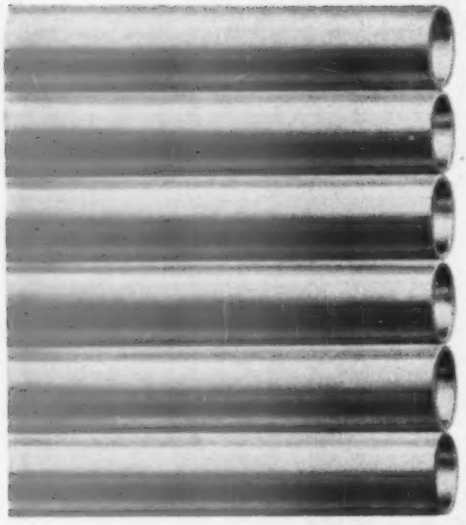
MW.163

ANACONDA

COPPER TUBING—REFRIGERATION QUALITY



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DEAN & WOOD (LONDON) LTD

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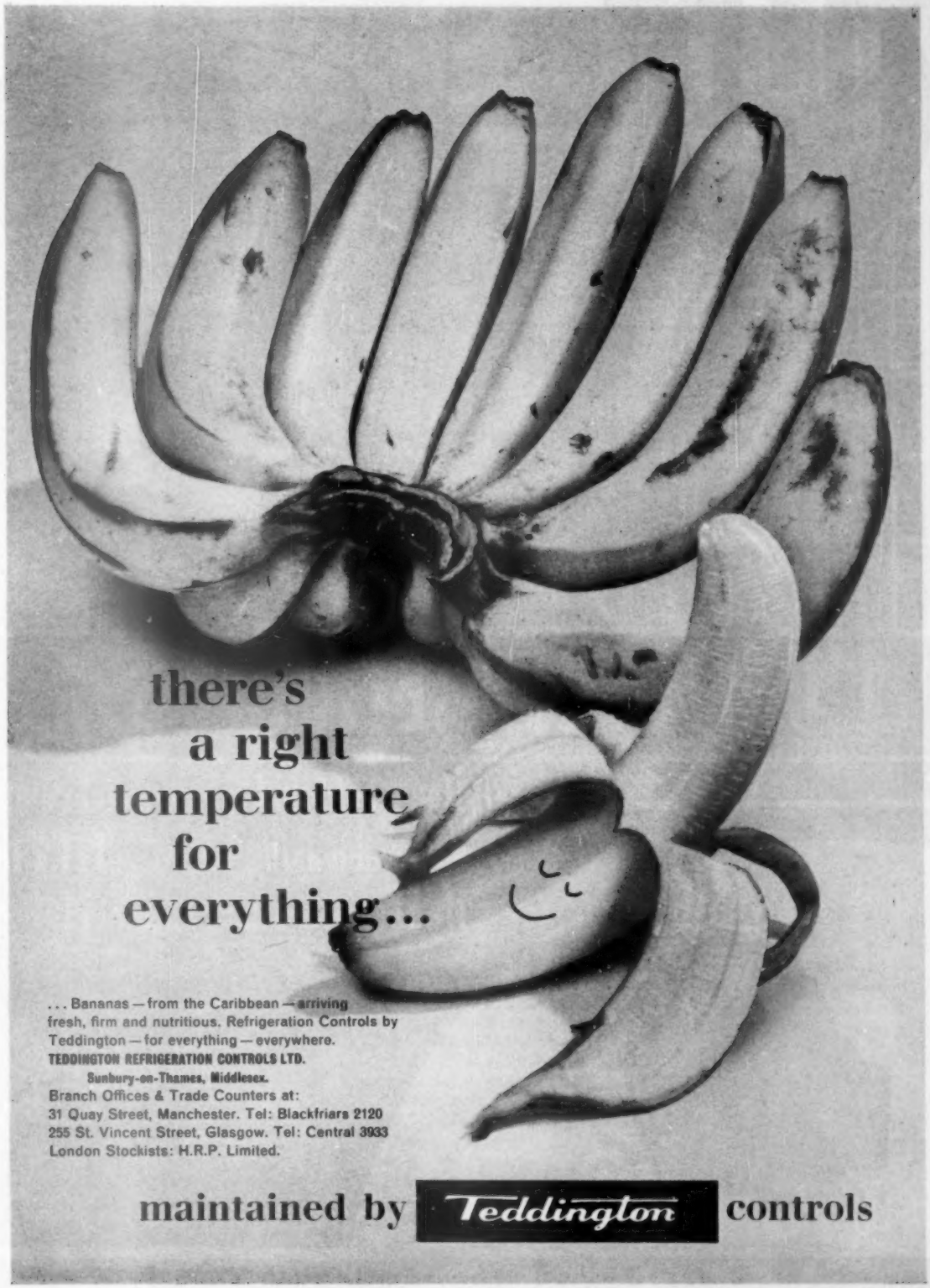
Phone : ABBEY 5841 / 4 Telegrams : VULCANOSUM, LONDON


there's
a right
temperature
for
everything...
... Bananas — from the Caribbean — arriving fresh, firm and nutritious. Refrigeration Controls by Teddington — for everything — everywhere.
TEDDINGTON REFRIGERATION CONTROLS LTD.
Sunbury-on-Thames, Middlesex.
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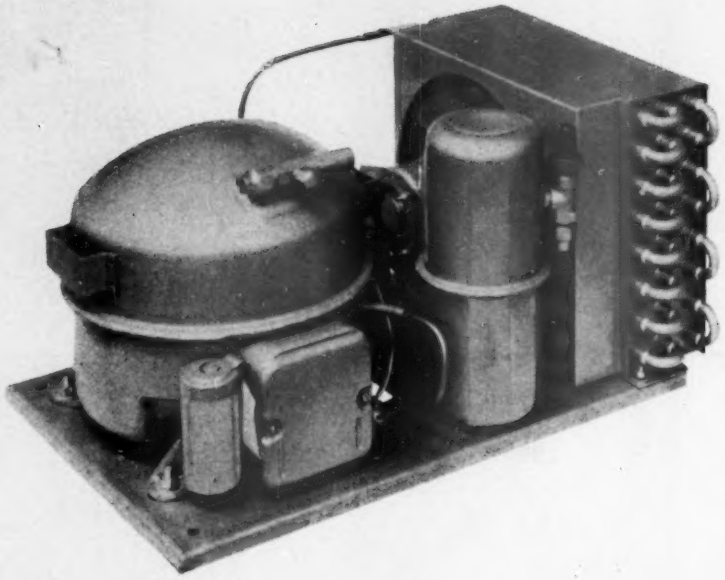
London Stockists: H.R.P. Limited.
maintained by Teddington controls



L'UNITÉ HERMÉTIQUE S. A.

CAPITAL N. F. 5.000.000

Household and commercial compressors and condensing units 1/14 to 4 HP.
Household and commercial systems

UNDER LICENCE OF
Tecumseh
PRODUCTS COMPANY

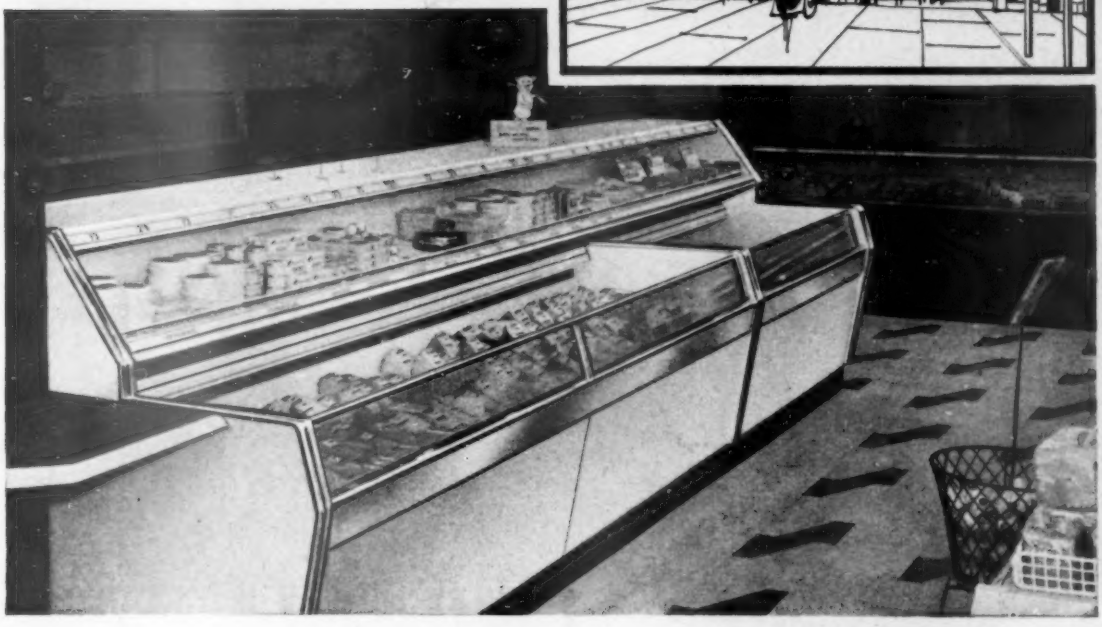
PERFEX 47 9

COMMERCIAL HEAD OFFICE
and TECHNICAL LABORATORIES

26, RUE DES AMANDIERS
NANTERRE - SEINE
TÉL. BOI. 20-81

FACTORIES : LA VERPILLIÈRE
ISÈRE

For this fine, up-to-date new store in Britain's most modern shopping centre . . .



. . . MAYPOLE CHOOSE FRIGIDAIRE REFRIGERATION—NATURALLY

Of course they choose Frigidaire! For this fine new store in Britain's first all-pedestrian shopping centre at Stevenage, Maypole wanted the very finest refrigeration equipment they could get.

Elegant and colourful sales cases. The Frigidaire Manhattan sales cases Maypole had installed are not only technically superb. They are extremely attractive in appearance. Manhattan cases are available in a big range of colours too, so it's easy to match up with your colour scheme.

This is what Maypole chose : one 18′ run of pale blue Frigidaire Manhattan Cases for dairy produce and sausages. One 18′ run of chilled shelf displays for cheese, fats, etc. One 18′ run of sea-green open top cases for meat display, with refrigerated storage at the back. And a 6′ Manhattan Minor display case for frozen foods.

Frigidaire cold rooms. Frigidaire also installed two cold rooms. One, 100 cu. ft., for provisions. The other, 500 cu. ft. and fitted with electrical defrosting equipment, for storage of prepared meat. A Frigidaire Conservator provides additional zero storage space.

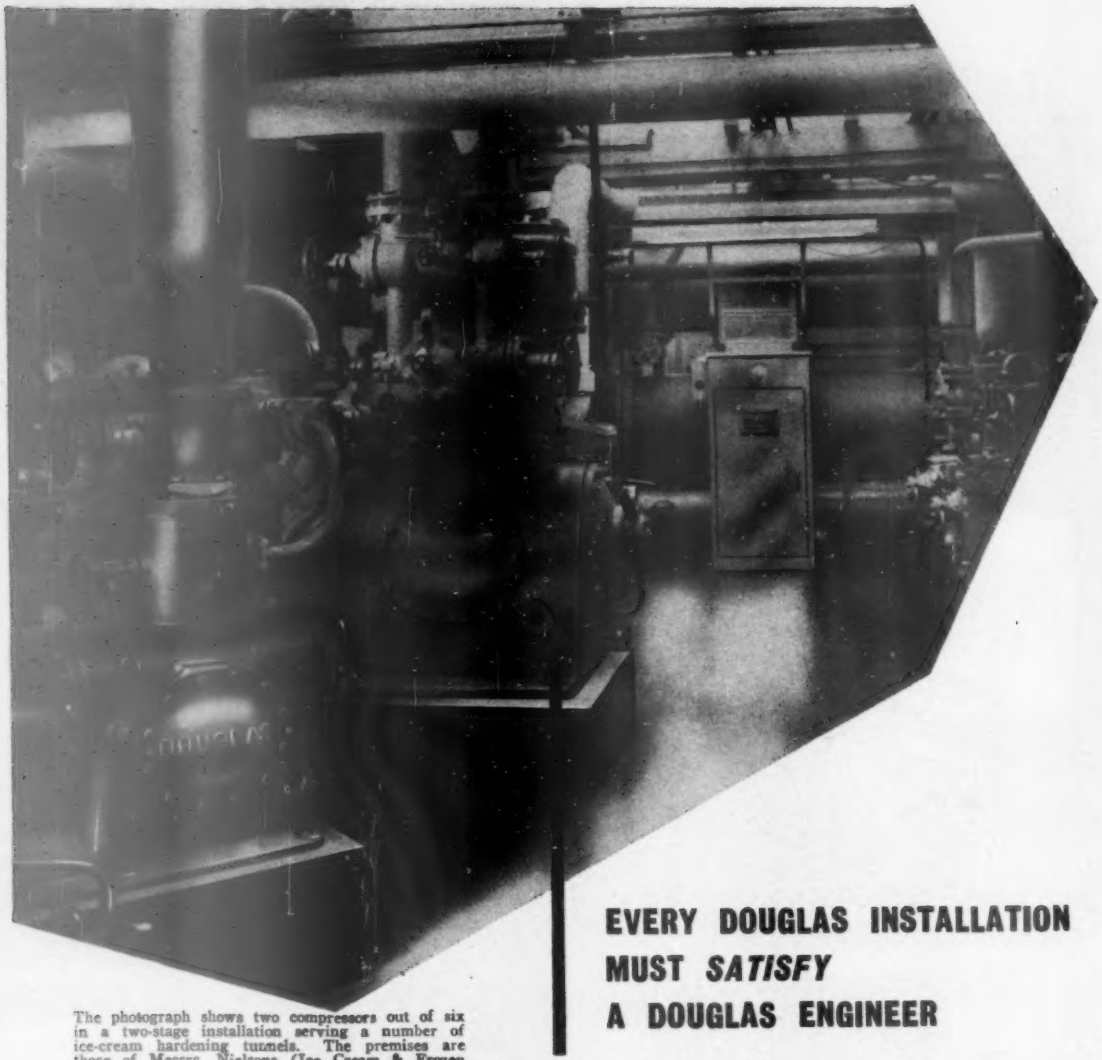
How about you? Have you a refrigeration problem? Then let Frigidaire help you. It doesn't matter whether it's a big job or small. Frigidaire can handle it. Write for further details or call your Frigidaire Distributor today.

FRIGIDAIRE

Regd. T.M.

means business—for you!

FRIGIDAIRE DIVISION OF GENERAL MOTORS LTD., STAG LANE, KINGSBURY, LONDON, N.W.9



The photograph shows two compressors out of six in a two-stage installation serving a number of ice-cream hardening tunnels. The premises are those of Messrs. Nielsons (Ice Cream & Frozen Foods) Ltd., by whose courtesy this photograph is reproduced.

OTHER DOUGLAS EQUIPMENT COMPRISES:

CONDENSERS shell and tube, or evaporative.
INTERCOOLERS
LIQUID AMMONIA PUMPS
EVAPORATORS Plain pipe, finned pipe, shell and tube, submerged type, flooded, etc.
INSULATION and COLD ROOM DOORS for all cold storage and low temperature applications.

DOUGLAS

EVERY DOUGLAS INSTALLATION MUST *SATISFY* A DOUGLAS ENGINEER

Reputation, not immensity, has been the foundation of Douglas growth, and every growing reputation depends upon reliability and experience. No less this one. That is why the most thorough care is taken with each installation—to ensure that everything is in perfect order.

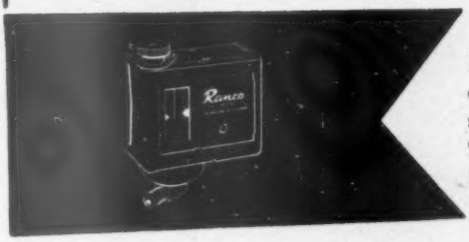
Douglas experience, combined with personal service, is appreciated by a considerable number of users. Douglas can probably assist you. Why not think about it?

WILLIAM DOUGLAS & SONS LIMITED, DOUGLAS WHARF, LONDON S.W.15. — Telephone: PUTney 8181

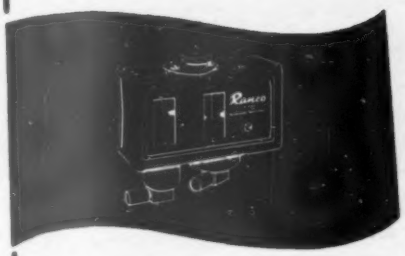
Ranco signals S·U·C·C·E·S·S

Ranco 'O' series temperature controls provide a single pole snap acting switch either closing the circuit on a rise and opening the circuit on a fall of temperature, or the reverse. The differential screw changes the CUT-OUT only on standard cooling controls: the same adjustment on standard heating controls changes the CUT-IN. Graduated visible scales indicate range and differential settings.

The Ranco 'O' series high pressure controls have been designed for commercial application. Controls can be supplied with various ranges between 100 lbs. per square inch and 350 lbs. per square inch. In all models the adjustable differential is from 30 — 100 lbs.



Ranco 'O' series low pressure controls have been designed for commercial applications. Controls can be supplied with various ranges between 12" vacuum and 95 lbs. per square inch. All controls can be provided with hand-reset for overload protection.



The Ranco 'O' series dual pressure controls combine the characteristics of both the low pressure control and the high pressure control in a single instrument.

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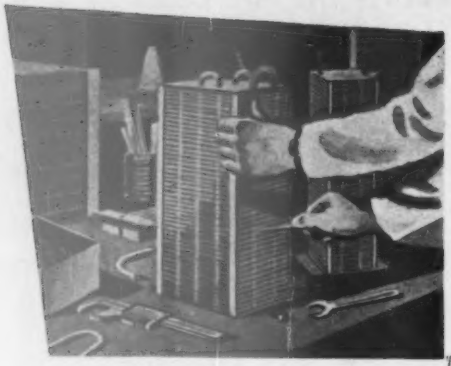

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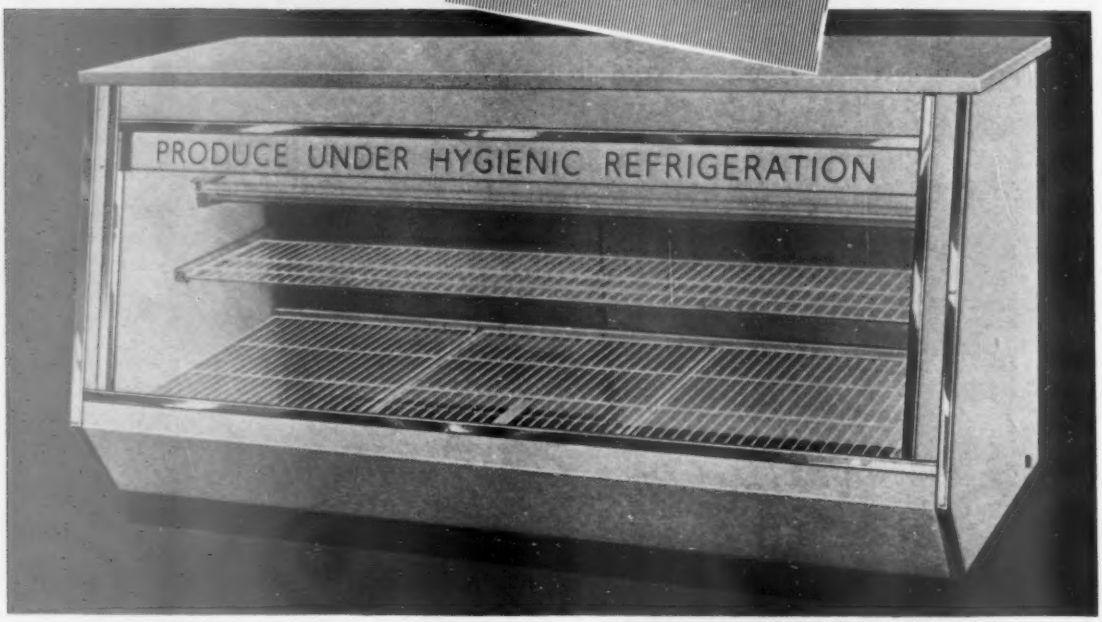

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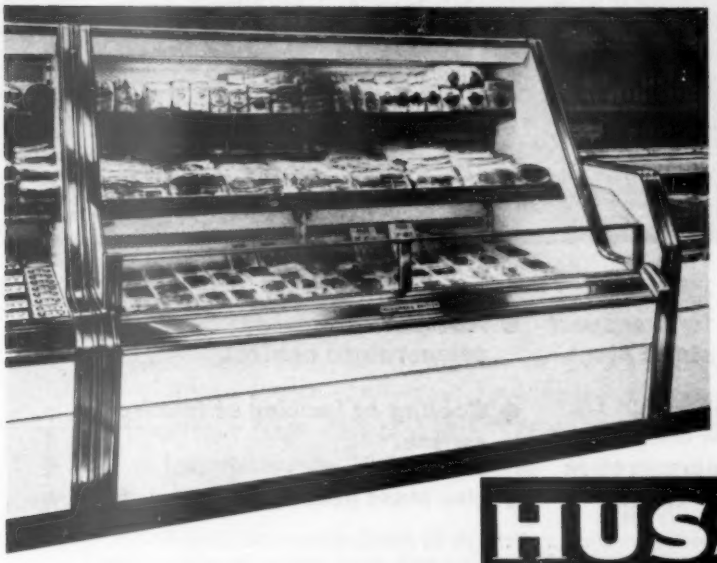

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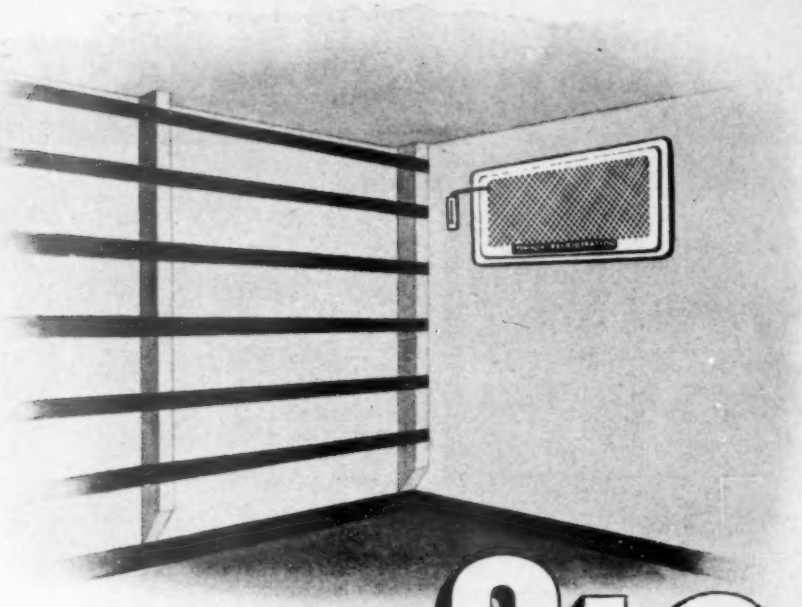

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P. 43/59

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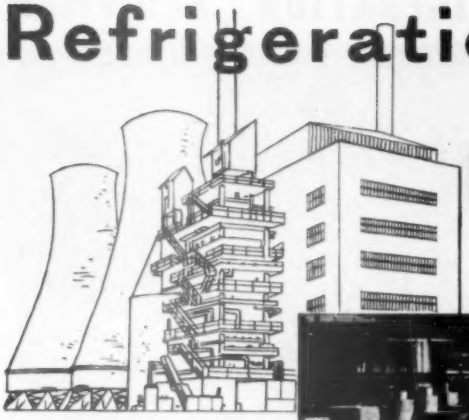
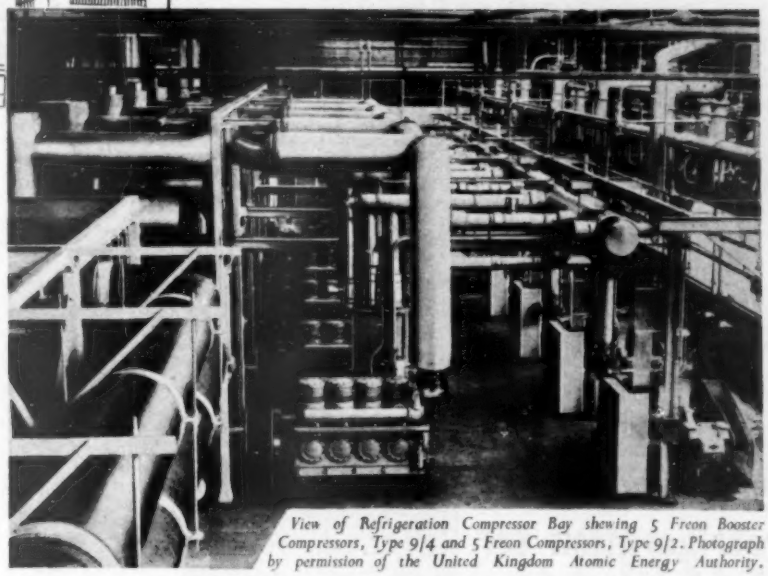
Refrigeration in industry



Nuclear Research



View of Refrigeration Compressor Bay shewing 5 Freon Booster Compressors, Type 9/4 and 5 Freon Compressors, Type 9/2. Photograph by permission of the United Kingdom Atomic Energy Authority.

For their factory at Capenhurst, the United Kingdom Atomic Energy Authority selected UDEC refrigeration.

This extensive installation is but one of the many undertakings with which UDEC refrigeration engineers are currently concerned — ranging from food storage to plastics, brewing to chemical processing, dyestuffs to oil refining, etc.

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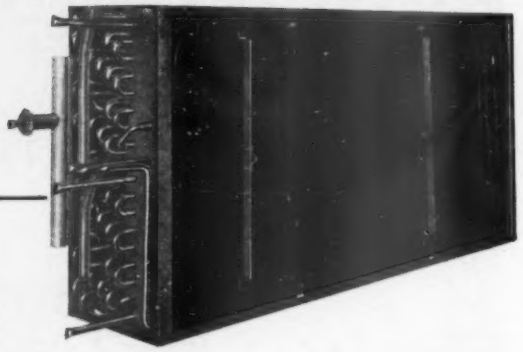

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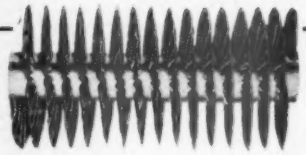

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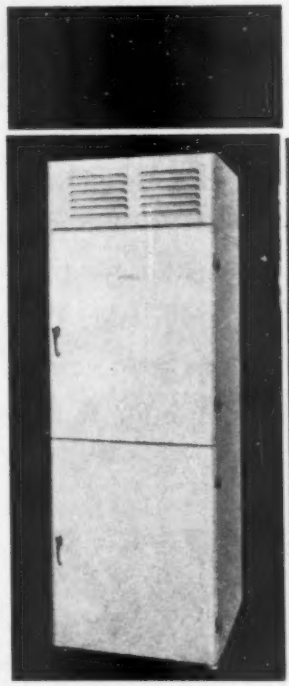

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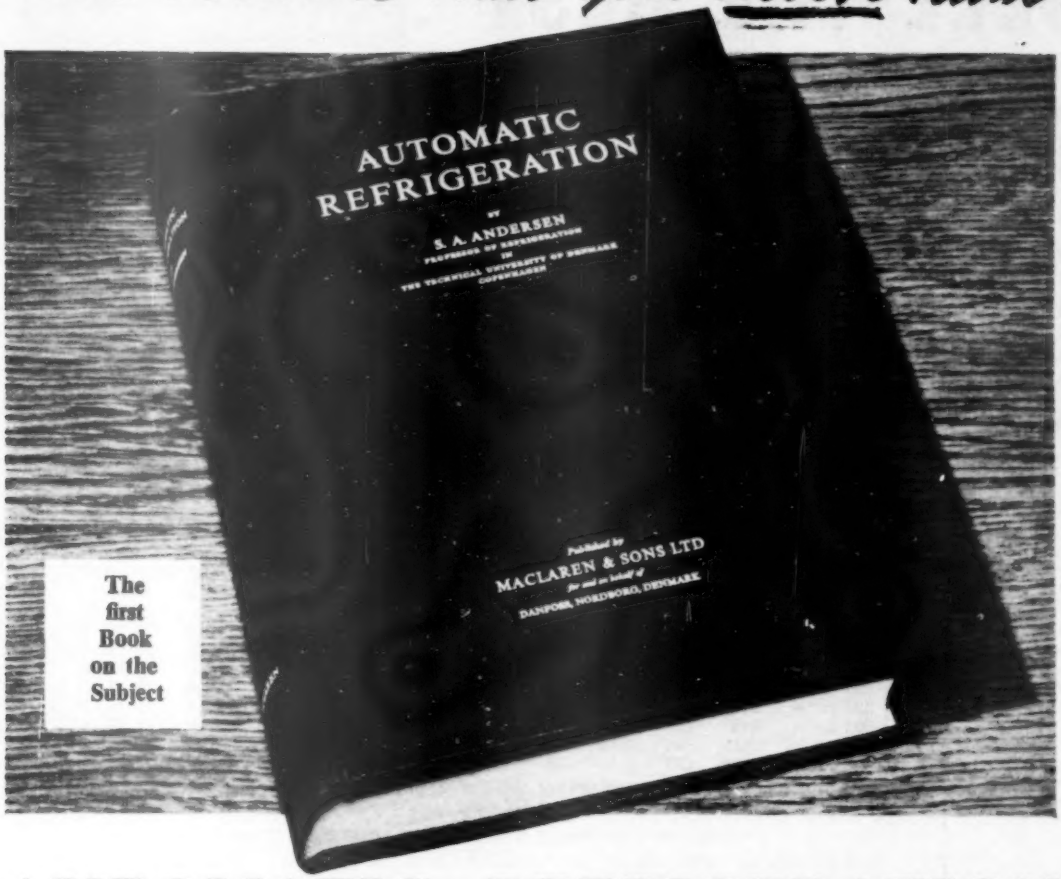

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350 cu. ft.	£545	£55	36 at	16	10 0	£644	£65	36 at	19	10 7
400 cu. ft.	£630	£65	36 at	19	0 0	£730	£73	36 at	21	18 6
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MANAGER

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REFRIGERATION Engineer, with not less than five years' experience; able to drive; sound knowledge of reciprocating units all types up to 5 h.p., and sealed unit mechanisms essential. Working knowledge of absorption principles an advantage but not essential; for progressive Sales/Service Organisation in London area. Apply in confidence to Box 1439. 1439

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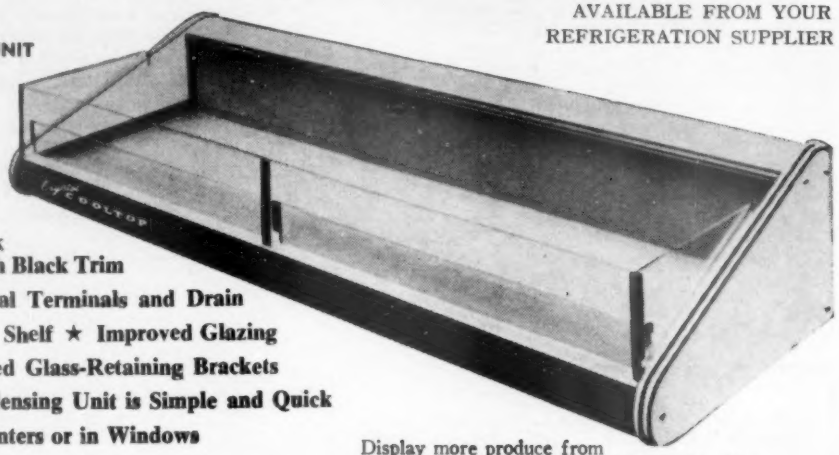

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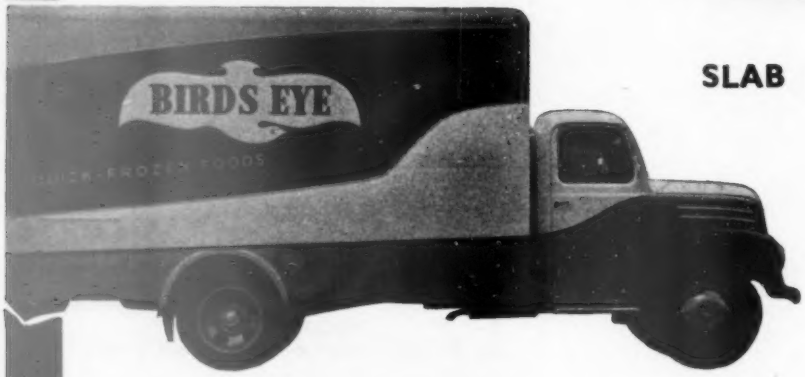

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and Air Control News

Incorporating
COLD STORAGE AND PRODUCE REVIEW
and ICE AND COLD STORAGE

Established 1898

VOLUME 63 NUMBER 744

MARCH · 1960

Contents

Editorial 256

News of the Month 258

Picture of the Month 259

Sterne's Hermetic Division 260

Smithfrige-McCray Production 263

An Interesting Trawler Conversion 266

Construction of Methane Carriers 269

Domestic Refrigeration Developments 273

Shop Refrigeration News 280

Institute of Refrigeration Bulletin 287

Commercial and Industrial News 290

Refrigeration Servicemen's Association 298

Dry Ice Production 302

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★

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Editorial . . . .

Refrigeration Exhibition

Expansion at Hillington

Antarctica now Colder

● Professional organizers have now well in hand a Refrigeration Exhibition of great moment to the industry. It is to be hoped that the event in question will become the official shop window for refrigeration plant and equipment and will have the full support of all sections of the trade and, indeed, of the technical refrigeration press, to whom invitations to act as joint sponsors have been extended. The organizers are not new to this field for it was they who, with the backing of R.P.L., put on the frozen foods show last October at the Horticultural Hall, London. The success of that event, more than 50 per cent. of the support for which came from the refrigeration industry, was the motivating spirit that has brought into being the Olympia exhibition planned for January 16 to 20, 1961.

● Visitors who travelled from many parts of Europe to Glasgow last month, battling through deep snowdrifts to reach the Hillington plant, were rewarded by what they saw in this most modern plant outside the U.S.A. Sterne's fabulous 60,000 sq. ft. extension was opened on the 18th *ultimo* by Lord Polwarth. Scottish Industrial Estates, their contractors and consultants, undertook a wonderful combined operation here; they started the extension in May and finished it on October 31st.

● This plant has been designed for machining to accuracies of ten thousandths of an inch, and surface finishes are normally specified around 10 micro inches. In order to selective-assemble parts finished to such fine dimensions, an air-conditioned assembly shop is necessary which is maintained at a temperature of 68°F. and a relative humidity of 50 per cent. or lower. Throughout all the processes of machining and assembly and right down through painting, dehydration, final assembly and packing, the motor compressors manufactured are subjected to most rigid quality control, which includes laboratory testing of all incoming materials. This spring, 4,000 units will be leaving the assembly line every day !

● This great achievement has been accomplished by the Hillington team under the dynamic leadership of the managing director, Mr. David S. Carruthers, whose wizardry in factory operation is well known to the industry. Fathering this tremendous expansion has, of course, been Sir Samuel Beale, K.B.E., chairman of L. Sterne & Co. Ltd., and Mr. P. B. H. Brown, vice-chairman. To have witnessed the successful completion of this latest achievement of Sterne's before his retirement early this month must have been a crowning satisfaction for Sir Samuel, son of the founder of the present organization and himself a Sterne-man for over 50 years.

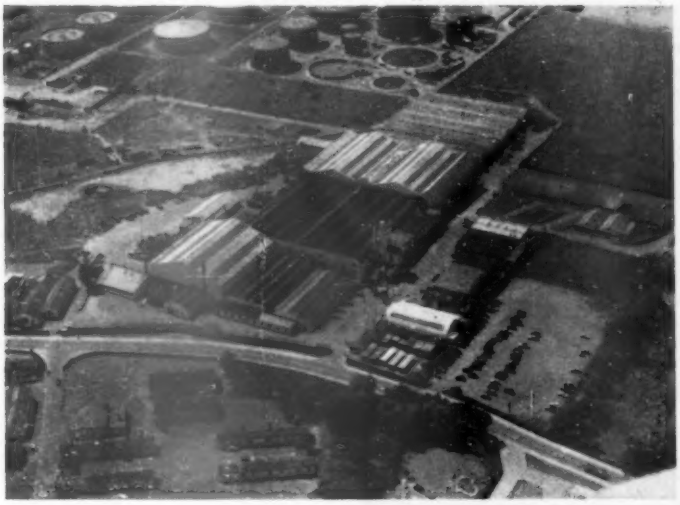
● Brine-freezing of poultry is gaining considerable ground in Great Britain. Devon Table Poultry Limited, Crediton, Devon, is one of the latest poultry processing concerns to venture into freezing by brine immersion. This method was decided upon in preference to the air blast freezer, more commonly used in this country, by Mr. K. W. Pope, the manager and secretary, after considerable research and experience in North America where freezing by immersion has long been practised. A federal society formed in 1955, Devon Table Poultry Limited, numbers among its members many farmers' societies; the organization has widespread coverage in the west country covering Devon, and parts of Cornwall and Somerset. At present, is has facilities for a weekly throughput of 10,000 birds of various classes, and provision has been made for a considerable increase. The freezing equipment is by York Shipley Limited and was installed by Arthur Brand Refrigeration Limited of Plymouth, distributors for York in Devon and Cornwall. It was designed to freeze 35 per cent. of the weight of 100 4½ lb. chickens every forty-five minutes entering 0°F. brine at 65°F. The 35 per cent. of the weight of the bird represents "crust freezing" which gives the flesh its white appearance, while the remaining 65 per cent. is frozen in a 1,500 c.ft .storage room held at a temperature of minus 5°F. The brine immersion tank is constructed of mild steel plate and measures 16 ft. long by 3 ft. 6 in. wide and 2 ft. 8 in. high with a protrusion on one side to house a York vertical spindle brine circulating pump. Compressed slab cork has been used to insulate the base and sides of the tank; the four loose covers over two-thirds of the top area are insulated with expanded polystyrene for lightness and finished on both sides with galvanized sheet steel.

● The claim to have supplied "the most southerly freezing plant in the world" is made by its British manufacturer. Early in 1958, G. Williams Engineering Co. Ltd., supplied plate-freezing equipment to A/S Tonsberg Hvalfangeri of Norway, the machines to be used for freezing whale meat. The interesting point is, however, that the company is in Norway but the freezers are installed at Huisvik Harbour, South Georgia, and must be the southernmost freezer installation in the world. The island is a base for whaling and during their summer, October to March (this being the whaling season) is a hive of activity with a population of just over 1,000 of which only two are women. This freezing installation of four 11-station

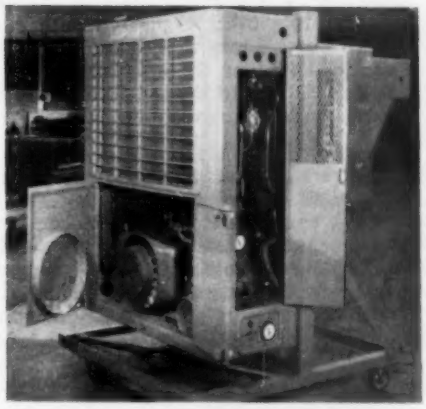
freezers has a capacity of forty tons per day. At present, it has facilities for a weekly throughput freezing, that only two of the current machines are needed to achieve this throughput and on 2 in. fish in trays the time is 42½ minutes.

● The operation of aircraft by refrigeration firms is no longer news in our industry but the taking over of an airport by a refrigerator company (or, more exactly, by its parent company) is, indeed, headline news. The Pressed Steel Company Limited has taken over the aviation interests and operation of the Oxford Airport at Kidlington. The management will comprise: Mr. J. W. Gillespie, general manager and Mr. L. V. Harcourt, aerodrome manager, both of whom are employed by the Pressed Steel Comany. This move is in no way intended to impose any restrictions on other users of the airport; it is intended to continue with all aspects of flying at present in operation, including the maintenance and servicing of aircraft in accordance with the regulations as laid down by the Ministry of Transport & Civil Aviation and Air Registration Board. Pressed Steel hopes that this extension of its interests will encourage and foster the increased use of the airport by light aeroplane enthusiasts and also by commercial operators.

Transport Unit Manufacture at Hamble



Aerial view of the Thermo King factory of Hawker Siddeley (Hamble) Ltd.



KL 10 Thermo King cooling unit.

As mentioned in our January issue, the Hawker Siddeley Group has embarked on a programme to supply British and overseas road transport owners with the world-famous Thermo King mechanical refrigerators, for fitting to vehicles in order to control the temperature of perishable produce in transport. We reproduce herewith an aerial view of the Hamble Works. The need for a suitable self-contained refrigerator, capable of controlling temperature within close limits, is growing with the rapidly expanding production of frozen foods and ice creams, coupled with the increase in transport of meat, fish, vegetables, fruit, etc. Thermo King Corp. who pioneered the development of transport refrigerators, today supply over 90 per cent. of the transport refrigerators sold in the U.S.A. One of the Canadian companies of the Hawker Siddeley Group started manufacture of Thermo King units in Canada a few years ago and are successfully supplying that market. They are known as Canadian Thermo Control Co. Ltd. At Hamble, near Southampton, Hawker Siddeley (Hamble) Ltd. have commenced production of a range of units in various sizes to meet conditions in Great Britain and in the export market. The Thermo King mechanical refrigerators are self-contained convection units for mounting in the front of the vehicle body by means of a few bolts; therefore installation takes but a matter of hours. The drive is by means of petrol engine, electric motor, hydraulic power or a combination of these forms. The condenser portion with compressor and drive, projects outside the vehicle body, and the evaporation section is self supported inside where it does not materially absorb load space. Body temperature is controlled within a few degrees by a thermostat which starts and stops the compressor as required. Automatic defrosting by means of a timing device maintains maximum efficiency and relieves the driver of this responsibility.

* * *

Mr. B. Waters, one of the senior application engineers of York Shipley Ltd., left for the U.S.A. last month to observe at first hand the operating features and wider applications of centrifugal compressors applied, principally, to air-conditioning installations.

NEWS OF THE MONTH

Refrigeration and A-c. Exports.—During January, 1960, air-conditioning and refrigerating machinery (commercial and industrial sizes) to the value of £942,954 weighing 1,448 tons, was exported from the United Kingdom. Comparable figures for January, 1959, were 1,207 tons, worth £740,931.

* * *

Exports' Analysis.—Of the 1,448 tons of air-conditioning and refrigerating plant worth £942,954 exported by Great Britain in January, 1960—quoted in the preceding paragraph—69 tons went to the Union of South Africa, 52 tons to India, 54 tons to Australia, 34 tons to New Zealand, 30 tons to Canada, 196 tons to " other Commonwealth countries," 88 tons to Eire, 26 tons to Sweden, 427 tons to Western Germany, 43 tons to the Netherlands, 34 tons to Belgium, 57 tons to France, 50 tons to Italy, and 288 tons to " other foreign countries."

* * *

Refrigeration Plant Classified.—Of the total exports of air-conditioning and refrigerating machinery during January, commercial refrigerators accounted for 330 tons, worth £169,224, industrial plant and equipment for 257 tons worth £146,493, and refrigerating machinery, equipment and parts, including parts of commercial refrigerators, for 633 tons, worth £445,684.

Exports of Small Refrigerators.—During January, 1960, 964 tons of complete refrigerators and domestic refrigeration equipment were sent overseas from Great Britain. These exports were worth £615,910. The 964 tons comprised 32 tons to the Union of South Africa, 18 tons to Rhodesia and Nyasaland, 5 tons to India, 23 tons to New Zealand, 553 tons to " other Commonwealth countries," 9 tons to Sweden, 90 tons to Western Germany, 5 tons to the Netherlands, 7 tons to Belgium, 22 tons to Italy, and 200 tons to " other foreign countries."

* * *

Low Temperatures and Alkali Metals.—Experiments in recent years have shown that lithium and sodium undergo partial crystallographic transformations at low temperatures. This type of transformation can be detected in several types of measurement which have been made in various low temperature laboratories—X-rays, mechanical properties, specific heat and electrical resistivity, according to Dr. H. M. Rosenberg of The Clarendon Laboratory, Oxford when addressing the Low Temperature Group of The Physical Society last month. An apparatus has been built in which the alkali metals can be examined under a microscope at liquid helium temperatures. With this apparatus the transformed regions can be seen, and the amount of the transformation can be estimated.

(continued on page 262)

A delegation from the German industry was recently welcomed on behalf of Temperature Limited by their director and general manager, Mr. F. L. Pettman (on left). Members were shown the company's latest developments in air-conditioning and packaged refrigeration plants, and visited factories at Fulham and Hanworth. This picture was taken during their visit to Fulham.

Lord Polwarth performs the opening ceremony.

NEW FACTORY OPENING

of the Hermetic Unit Division of L. Sterne & Company Limited

★ Sterne's opening day at Hillington last month took on the appearance of an international refrigeration congress, confirmed by the words of Mr. D. S. Carruthers in his greeting : "I welcome the considerable number of people who are with us here from countries abroad ; we have visitors from Germany, Italy, Sweden, Norway, Denmark, France, Holland, Belgium, Finland, and of course England ! I appreciate particularly how some of these people have made a long journey in this wintry weather so that they may rejoice with us at the start of our new adventure. We have with us to-day many of our honoured customers, and also our honourable competitors. It is a very pleasant thought to me how many of our competitors of the past have now become co-operators, so that we stand shoulder to shoulder in our united efforts to produce more and more refrigeration."

"THIS is a great day for Scotland," said Lord Polwarth, chairman of the Scottish Council (Development and Industry), when he opened a 60,000 sq. ft. extension at the Hermetic Unit Division plant of L. Sterne and Company Limited, at their Hillington Works.

More than 300 visitors from many different parts of the world and representing every branch of the refrigeration industry were their guests at the opening day ceremony on the 18th *ultimo*.

After the official opening ceremony the visitors were taken on conducted tours of the new plant where they saw all the processes of machining, assembly, dehydration and packing of the Tecumseh hermetically-sealed units which are manufactured by the company under an exclusive licence from Tecumseh Products, Michigan, U.S.A.

Tribute to the firm was also paid by the Lord Provost of Glasgow, Sir Myer Galpern and the Provost of Renfrew. Sir Meyer said that it should be recognized that a great contribution could be made to the economy of Scotland if other existing firms had the same faith in the industrial development of the country. The opening ceremony was presided over by Mr. David S. Carruthers, managing director of the Hermetic Unit Division.

The factory's output will shortly be 4,000 units

The beflagged front of the Sternette works in Glasgow. These already large premises have been extended by 60,000 sq. ft.

Sir Samuel R. Beale, K.B.E., chairman of L. Sterne & Co. Ltd., presides at the luncheon. On his left is Lt.-Col. Lord Dudley G. Gordon, D.S.O., LI.D.

per day, double the production of a few months ago. Plans are now being completed for the production of compressors at the rate of 2,000 every 8 hours! Last year the firm installed new machine tools to the value of £440,000 and this year they will spend another £400,000 on machine tools.

This highly-specialized plant is designed for machining to accuracies of ten thousandths of an inch, and surface finishes are normally specified around 10 micro inches. In order to assemble parts finished to such fine dimensions an air-conditioned assembly shop is necessary, which is maintained at a temperature of 68°F. and a relative humidity of 50 per cent. or lower. Throughout all the processes of machining and assembly and right down through painting, dehydration, final assembly and packing, the motor compressors manufactured are subjected to most rigid quality control, which includes laboratory testing of all incoming materials.

As indicated in our August issue, work has also begun on a big new project manufacturing the "AM" range of domestic compressors. These are very small high-speed compressors which will be ideally suited for the modern small table-top refrigerator. A big production line is being laid out for this model giving a capacity of 2,000 per shift. It is hoped that production of this model will commence before the end of this year. A further development is the new high-speed "in-line" twin compressor. This range will be from 2 h.p. up to 10 h.p. and will provide compressors for air conditioning or commercial work at prices well below anything that is being offered on the market to-day.

Although the largest single market is the British Isles, 65 per cent. of the products are exported with Canada, West Germany and Scandinavia the principal overseas buyers. It is expected that the export for 1960 will total about £4,000,000.

Mr. David S. Carruthers, managing director of the H.U.D., proposes the toast to the guests at the luncheon.

Mr. James Douglas, London director, L. Sterne & Co. Ltd., fourth from right, with, on his immediate right, Mr. John A. Howie, and, reading from the right of the picture, Mr. E. G. Batt, Mr. R. J. Simpson and Mr. R. H. Hemmings.

At a luncheon in the Central Hotel, Glasgow, which followed, Mr. S. A. Slarke of Rubery Owen and Company Limited described the expansion of the Hermetic Unit Division as a "shot in the arm to Scottish industry." Sir Samuel Beale, K.B.E., chairman of the company who presided at the luncheon, thanked the Scottish Industrial Estates Limited, who completed the new factory in less than 5 months. He also spoke of the co-operation which the company had received from Tecumseh Products. The toast of L. Sterne and Company Limited was proposed by Professor Adam S. T. Thomson, head of the engineering department of the Royal College of Science and Technology, Glasgow.

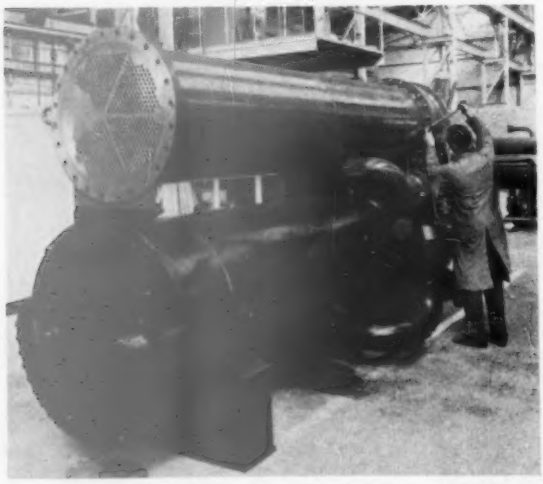
Mr. James Cant, export division, H.U.D., with some foreign guests in the conveyorized air-conditioned assembly shop. Countries represented in this group include Germany, Italy, Holland and Belgium.

Congratulating the firm on their progress Lord Polwarth said that a great deal was heard these days from various quarters both inside and outside Scotland about what was wrong with Scottish industry and that all family concerns were lacking in enterprise. "What nonsense this all is, when you see what is going on here to-day. The firm," he said, "was an old family concern which has increased its turnover from £6,000 in 1914 to £600,000 in 1944 and the target for this year is £6,000,000."

Mr. F. E. Kewley, export director, L. Sterne & Co. Ltd., with three senior executives of a leading Swedish refrigeration company which uses Sterne's units and a member of the technical press.

News of the Month (*continued*)

Turbo Refrigeration at Sea.—Two water chilling plants having a combined refrigeration capacity of 600 tons were installed by York Shipley Ltd. as part of the air-conditioning scheme recently carried out to the 13,654 tons Furness Withy liner, *Ocean Monarch*, during her annual refit at the Palmer's Hebburn works of Vickers-Armstrongs (Shipbuilders) Ltd. The plant consists of two single-stage, turbo, packaged water cooling systems with the compressors direct coupled to Terry steam turbines. The compressors are fitted with pre-rotation vane control which provides capacity variation in infinite steps down to between 5 and 10 per cent. of full load. The heat exchangers have Integron fin copper tubes in the cooler and aluminium brass in the condenser.



Condenser and cooler, part of the water chilling plant for the "Ocean Monarch," being assembled at the London works of York Shipley Ltd.

New Refrigerated Liner.—The single-screw motorship *Turakina* was launched from the shipyard of Bartram & Sons Ltd., South Dock, Sunderland, last month. Built to the order of The New Zealand Shipping Company Limited, London, the *Turakina* has been specially designed for the carriage of refrigerated cargo, chilled meat, and general cargo. The vessel is of the full scantling flush deck type with long forecastle, and has been constructed under the special survey of Lloyd's Register of Shipping and in compliance with the latest requirements of the Ministry of Transport and Factory Acts for this class of vessel. The principal particulars are as follows :—Length overall 454 ft. ; length between perpendiculars 425 ft. ; breadth moulded 62 ft. ; and deadweight (tons) 8,200 tons. Insulated space 320,000 c.ft. ; general cargo space 40,000 c.ft. The insulation of the vessel is being supplied by The Mersey Insulation Co. Ltd., and refrigeration by J. & E. Hall Ltd.

OBITUARY Mr. E. A. Roden

We much regret to have to record that Mr. E. A. Roden has passed away.

Bert Roden, as he was known by many friends in the industry, joined Kelvinator Ltd., in 1928 as chief accountant and became the company's secretary in 1934, in the very early days of domestic refrigeration. It was vitally necessary then to do a great deal of pioneering in all sections of the industry, including finance. Mr. Roden subsequently joined the board of directors, and was a member until he retired in 1957.

Mass Production at Smithfield Refrigerator Factory

THE well-known firm of refrigeration manufacturers and design specialists, The Smithfield Refrigerator Company Limited, of north London, have lately entirely reshaped their production techniques.

This new policy at the Hornsey factory has been dictated by the fact that last year the managing director, Mr. W. Horace Partridge, concluded an agreement with The McCray Company of Kendallville, Indiana, to produce their range of refrigerated display cases in Great Britain. McCray cases are all-metal products and require, in their building, mass-production methods based on sheet steel working and assembly.

Readers will recall that Smithfield Refrigerator, for many decades, has been well known in the industry for the manufacture of shop display cabinets and walk-in coldrooms of high quality. Finding particularly wide acceptance has been the Smithfrige open-topped case cooled on the company's patented Rotorflow principle. Parallel with this standardized production has always been manufacture of

New Techniques at Hornsey

Above: The traditional methods of constructing wooden-framed cabinets, with highly skilled labour, are still employed in one section of the factory.

Right: Polystyrene insulating material is now widely used.

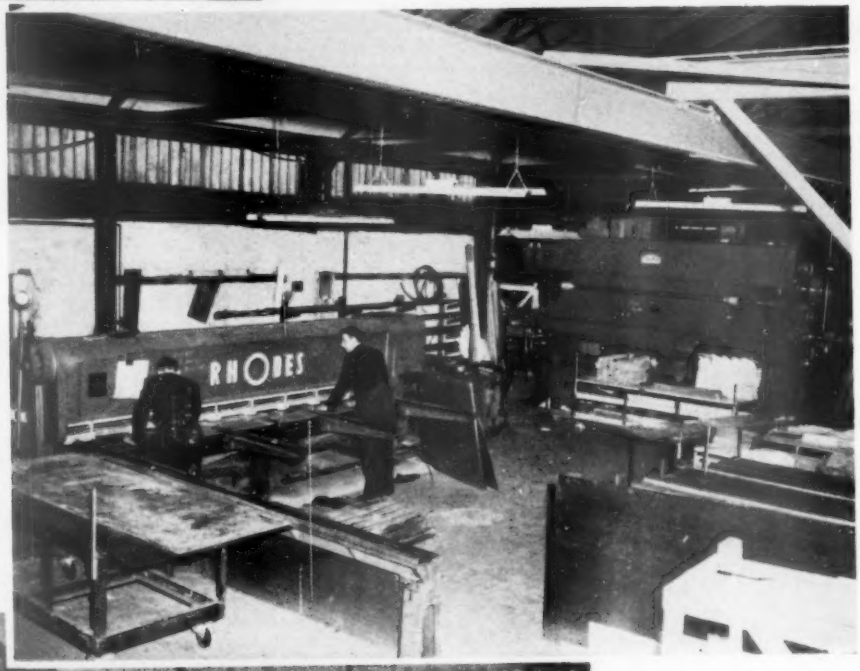
" specials " such as blood bank coolers pioneered for the Services during the second world war.

While the skilled outturn of wooden-framed cabinets will continue to form an important part of the Smithfield programme, metal-working is now to the fore in these works.

In the manufacture and assembly of the new series Smithfrige-McCray cabinets, the steel sheets are cut in a Rhodes guillotine, either in 8-ft or 12-ft lengths, the two standard lengths in the new series, and placed on castored tables ; from here the cut sheets are taken to the Rushworth folder for punching and folding.

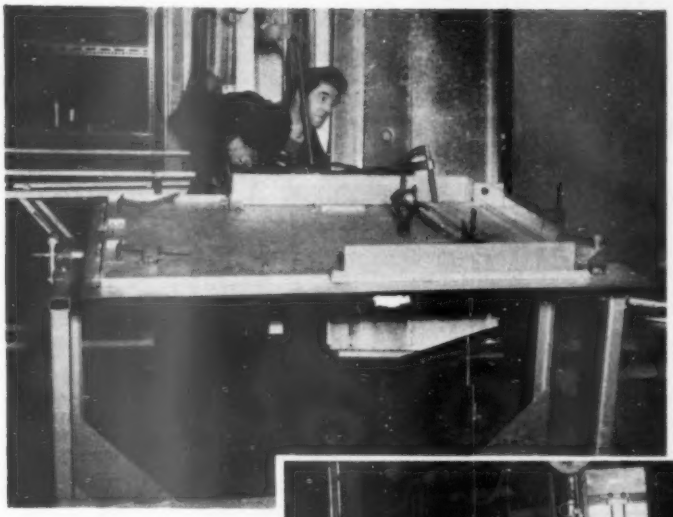
The essence of the McCray building technique is

Above: Craftsmen work on the well-known range of Smithfrige cabinets.

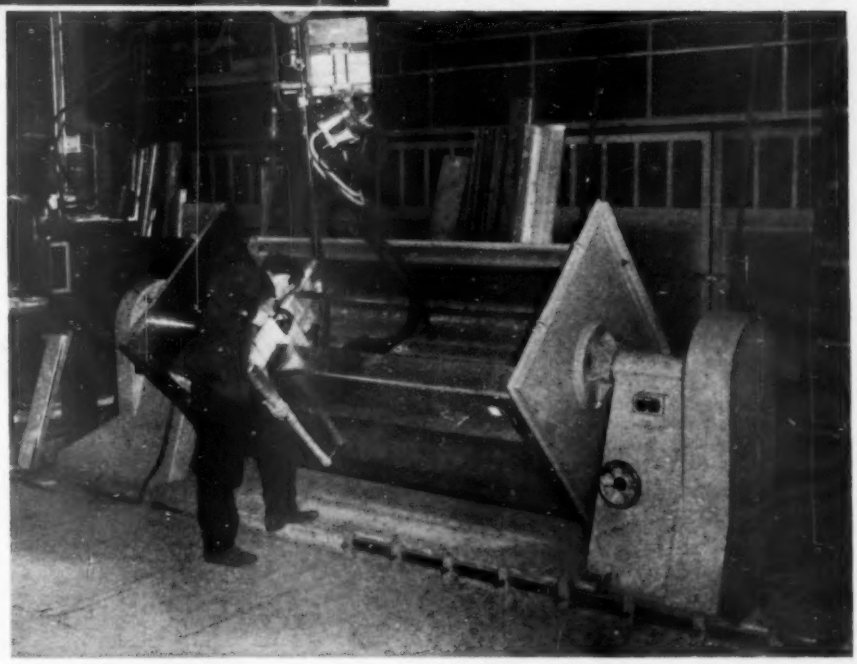


Right: Modern guillotine and power press for the new range of all-metal cabinets.

Left: On this punching machine a great variety of the 600 metal parts of the McCray cabinet are out-turned.



Left: Sub-assembly work proceeding with a portable spot welder.



Right: Final-assembly on a rotating jig ensures perfect alignment of the various parts.

the stock-piling of approximately 600 parts for ready availability in constructing the four types currently being produced. In this way, production and assembly need not be consecutive operations for, having built up sufficiently large stocks, assembly can proceed independently of the output of guillotine, folding and punching machines. The elasticity which this works procedure allows makes for highly economic use of labour and for extreme efficiency in all departments concerned.

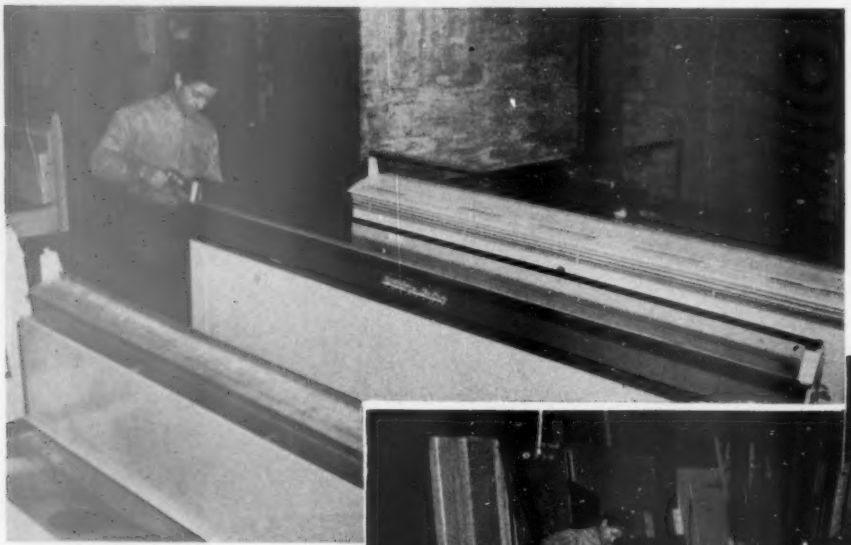
The assembly floor is divided into two very cleanly cut sections, namely, sub-assembly and final assembly. In sub-assembly, a pedestal spot welder is employed for joining the major units, the pressure and time of the welding operation being automatically controlled. A portable spot welder is also used for marrying the multiplicity of small parts to the front, back and ends of the cabinet. Extreme accuracy in final assembly is achieved by inserting the major units in a rotatable jig wherein they are welded by a heavy duty portable spot welder.

The spray booths and finishing shop are of conventional pattern but are none the less of a necessarily high standard in line with the quality looked for in the final product.

The Smithfrige-McCray range includes cases for selling meat, dairy produce, frozen food and ice cream. They are available with detachable ends to

permit single or continuous installation. Colour and finish can be chosen to match the decorative scheme of the shop. All cases are cooled by "Koldflo" forced air circulation; frost is collected on the cooling coil in the base and is thawed and removed entirely automatically. The following are the various models, showing display area, sq. ft., and display volume, c.ft., in parentheses :—

M—8a, meat, wall type (22·26, 29·8)
DAS—8a, dairy, three tier (36·0, 40·9)
FF—8b, frozen food, wall (19·66, 25·0)
IC—8b, ice cream, wall (19·66, 25·0)
IDFF—8c, frozen food, island (19·66, 21·29)
IDIC—8c, ice cream, island (19·66, 20·47).



A close-up view of a typical Smithfrige - McCray cabinet reveals the air circulation vanes at the top-back of the case. Having the appearance of venetian blind slats these diffusers have a greater cant at the top which ensures that a flow of slowly moving air blankets the lower, higher-speed stream.

Smithfrige-McCray cabinets in the finishing shop.

New Grimsby Store.—Groundwork has commenced on a 2,000 square yards site for the extension of the Levington Street, Grimsby, low temperature store for Chr. Salvesen & Co. The new building will back on to Humber Street almost opposite the rear of the existing store on the other side of the road. The loading dock, almost 100 ft. in length with platform at tailboard height, will be situated in Trinity Street and approached by a new road to be cut alongside the store connecting Humber Street with Trinity Street, An interesting feature is that the extension will be refrigerated from the engine room of the existing store, and to make this possible an overhead pipe bridge some 4 ft. wide and 80 ft. long will span Humber Street and connect the two stores. The extension will take the form of a 24 ft. high single chamber, steel framed without internal pillars or beams. Insulation will be of expanded polystyrene and cork 9 in. in thickness and all vapour sealed. Outside finish will be of troughed aluminium sheeting. The whole will rest on 4 ft. high brick sleeper walls which in turn are supported on 215 concrete piles sunk 30 ft. below ground. The new chamber will be capable of maintaining any temperature between +15° and -20° F., and is expected to be completed by June of this year.

The *SMALLEST* Trawler-Freezer in the World

THE *Autumn Sun*, a 110-ft. trawler, made her first operational run in January unloading 70 tons of frozen herrings upon arrival at her home port.

In this brief announcement from The Henry Sutton Organization and G. Williams Engineering Co. Ltd., an interesting story unfolded, for while many of the experts and critics have been advising the fishermen of the world how to put their homes in order, these two companies have quickly gone ahead and done the job.

The quick-freezing cabinet.

In Yarmouth, the old-established firm of Henry Sutton has always been known as being in the forefront with new ideas and technical development. Packing kippers with butter is a recent one. So with all the current discussions on freezing fish at sea, and all the speculation as to costs, varying from the " half a million, old boy " to " I'll do it with second-hand equipment, guv, cost plus 20 per cent.," they decided there was only one way to find out—prepare a scheme based on one of their vessels.

Previous business associations with G. Williams Engineering indicated the engineers for the job, and a quick check confirmed that they were quite happy to co-operate in such a new development.

The vessel to be converted, the *Autumn Sun*, was a 110-ton trawler commissioned in 1957, 110 ft. long and 22 ft. in the beam. After consideration of the layout space, and problems involved it was decided to tackle the job in such a way that costs and freezing experimentation could be evaluated, but also so that the vessel could answer a specific problem of the Sutton Organization. To the fish processors, the problem facing Henry Sutton is well enough known. Herring, pilchard, sprats and other types of fish are seasonal and the best catches come from different areas of our waters dependent upon the time of year and conditions; at these times much of the fish taken from the sea by local fishermen makes overland journeys to the processing and packing factories, a journey full of hazards of weather and road conditions and one which frequently involves double handling, with its attendant great risk of a serious loss in quality.

How wonderful it would be to have a freezer trawler which could take from the sea off Cornwall in October the prize pilchards and bring them frozen and in perfect shape into Yarmouth, or herrings from Stornaway in January and sprats off Boston in May. What endless possibilities were opened up !

In order to get the maximum use out of the vessel, the freezing capacity was higher than could be justified by her own fishing capacity in order to be able to accept the fish from other vessels, thus ensuring a full load on each trip. The job became bigger whenever one looked at it and the variable never ending but finally the plans were laid. " Convert most of the hold to a frozen store,

a section to the freezing area, a former cabin on the main deck to the refrigeration plant room "—these were early instructions.

The conversion of the vessel was carried out under the control of Mr. Percy Sutton, managing director of The Henry Sutton Organization and his chief refrigeration

The frozen fish in the trawler's store.

engineer, Mr. Adams, at Yarmouth, by Gus Lee and Goswell Ltd., electrical work by H. M. Campbell, both well-known local firms. For G. Williams Engineering, Mike Tiley and Jack Baker planned and supervised the work.

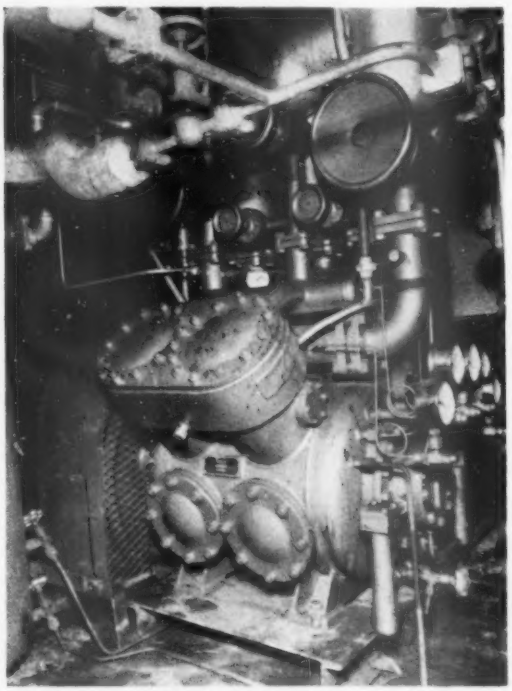
The hold, originally insulated with 4 in. cork, had 5 in. of expanded plastic insulation added. Amidships, the freezing operational area was central and four blast chambers were built on either side, the plant room was just aft of this but one deck up, on the main deck, housed in the superstructure. The main freezer compressor is driven by a 45 h.p. motor which receives its current from the generator which supplies power for the trawl winch. The small compressor to hold the cold store down to temperature is driven by a 12½ h.p. motor taking power from the small generator normally used for ship services when in dock. This meant no additional power units were required.

The refrigeration plant designed, supplied and installed by Williams, used a galvanized shell and tube condenser cooled by sea water. The liquid receiver arranged to receive from the condenser and to feed the horizontal surge vessel and liquid pumps irrespective of pitch and toss or roll of the vessel. The blast chambers, four in a row on each side, have a large bank of extended surface finned tubing mounted above them and fans which circulate the air over the evaporators and down through the chambers and back up over the coils. Additionally, by controlling flaps at the forward end of the coils the full refrigerant effect can be directed into the insulated hold. For holding the stored fish at –5° F. the small compressor is used on the same air cooling system. The " Grasso " machines, which are sold exclusively by Williams, are revolutionary in their design and manufacture in that the casting has been eliminated ; in its place a welded structure of high-grade sheet steel and barrel section is used and the machines are very light, compact and of great strength, attributes which whilst of considerable value in a shore-based installation, are a great boon in the confined space and restrictions of a vessel.

The main freezer compressor, a Grasso AV 40 by 110, has a capacity of 24 tons at –30° F. in an area of 25 c.ft. and the cold store compressor AJ 20 by 70 has a capacity of 2·3 tons.

For coverage against breakdown, as has been detailed, either compressor and the coils on each side can be used on the refrigerated hold ; dual pumps and general controls are also fitted, and hot gas is used for defrosting of the coil as required.

In operation, the fish after catching are gutted and packed into trays on deck ; they are lowered through



The main freezer compressor, a Grasso AV 40 by 110.

the central hatch to the freezer where the trays are loaded into the carrying frames of the freezing chambers. After 2½ hours they have reached –20° F. and are then passed forward into the refrigerated hold. If or when trawling is in operation and the winch in use, when the power supply is not available for the main freezers, the fish is boxed, iced and stored in the insulated forward hold until required for freezing ; this would also be used if

fish were being brought aboard from other vessels at a rate faster than the freezers could deal with it.

The first trip was successful. It entailed a run to Stornaway where herring fished by other vessels were frozen and brought back to Yarmouth. This is undoubtedly the first of many trips and many such ships.

Unquestionably, this is a big step forward in the realm of fishing-freezing vessels, and all those who have been fortunate enough to see the *Autumn Sun* have appreciated the ingenuity of Williams Engineering and Mr. Adams in solving the very complex problems encountered in this conversion.

For both sides, it has been a very instructive operation and gives both companies a very sound background to make even more speedy and efficient, the other similar conversions which are planned.

Williams Engineering having specialized in quick-freezing equipment since the inception of the industry in this country. With their new direct conduction plates they are achieving the figure of 54° to -5° F. in 42½ minutes and down to -25° F. in only 50 minutes.

ALFRED PORTER EXPANSION

New Hounslow Factory

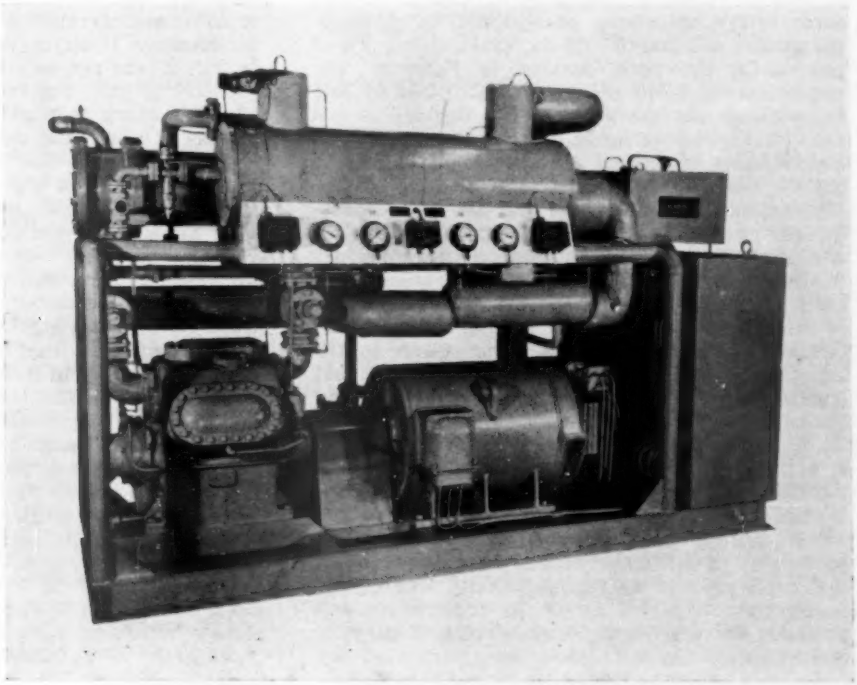
A NEW 60,000 sq. ft. factory is being built for Alfred Porter & Company Limited., at Hounslow, Middlesex. The company, which is outgrowing its present works at Stanley Road, Teddington, expects to occupy its new premises in approximately 18 months' time.

The firm was founded in 1947 by the late Mr. Alfred Porter, M.INST.R. Manufacturing and installing refrigerating plant, the company was initially concerned with methyl chloride and " Freon-12 " equipment for the ice cream, dairy engineering and cold storage industries. By 1949, the original premises on the Great West Road were producing compressors of 3 to 30 h.p., together with the heat exchangers within the refrigerating system.

In 1951 a move was made to Stella Works, Teddington, its main activities being plant for air conditioning and process cooling. In order to exercise complete control of installations carried out by the company, the policy was to manufacture all the major items of equipment used, and many contracts of considerable magnitude were carried out. The late 1950's saw the design and production of chemically-operated air-drying cabinets under the well-known trade name of " Humiditrol." This packaged-unit construction is designed for low-dewpoint space conditions.

The speciality of the company has always been industrial refrigeration, which—particularly in air-conditioning—calls for higher compressor speeds with variable capacity control, and heat exchangers

(*continued on page 273*)



Porter 50-ton self-contained water plant.

SEA TRANSPORT OF LIQUID METHANE

"It can be visualized that within the next decade we shall see, either under construction or actually in operation, some 50 ocean-going gas carriers," said Dr. J. J. McMullen, president of the Hudson Engineering Company, New Jersey, when he delivered the Thomas Lowe Gray lecture of the Institution of Mechanical Engineers recently. His subject was the "Sea transport of liquid methane."

THERE was, said Dr. McMullen, an ever-increasing demand for the utilization of large ocean going tankers, and he thought that an increase would take place in the transport of gases by ship. The development of this type of ship had already started and at the present time ships were carrying all types of gases including liquid methane propane and butane. These initial developments had been inspired by the demand for low cost energy in one form or another.

In reviewing the possible sources for gas, the World could be divided into five general areas: 1. North America, 2. South America, 3. Middle East, 4. North Africa, 5. European Continent. Giving some figures concerning consumption in America, the speaker said that in 1958 the total consumption of gas during the peak demand in February was approximately 8,910 million therms, while in July the demand was only 4,827 million therms. It was this tremendous variation which necessitated the consideration of natural gas storage by utilities in either gaseous or liquid state. Gaseous storage required tremendous volumes and the use of underground reservoirs, which in certain areas were not available. The volumetric ratio of gas to liquid for methane was 630. Ethylene and propane ratios were slightly less, being 485 and 316, respectively. It was for this reason that in the United States increasing consideration was being given to the liquefaction of natural gas and storage in the liquid state. This tended to make transport by sea more attractive.

Reserves

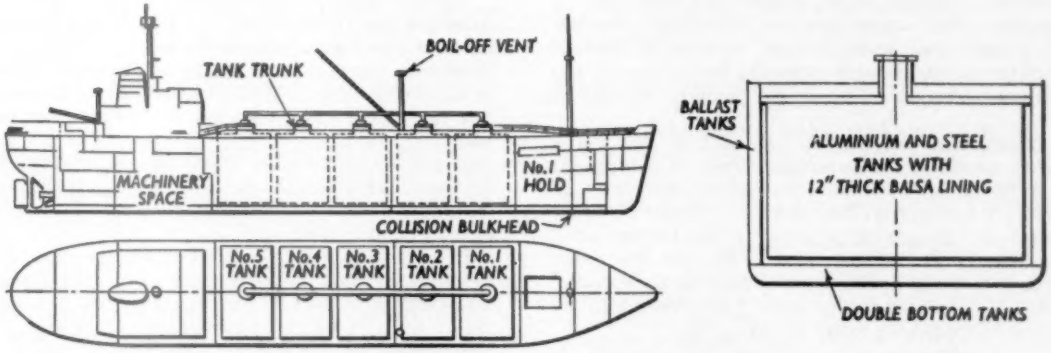
At this point Dr. McMullen gave an analysis of the world's natural gas resources and outlined methods of production and some of the problems which had to be overcome in transport from sources to the sea, etc. The author related these factors to cost and explained the uses of pipelines. One of the areas which appeared to be the most likely and available for the development of natural gas was North Africa. At the present time, there were vast known gas reserves (about 17,000,000 c.ft.) and it was quite likely that, owing to the proximity to Continental Europe and Great Britain, the first movements of gas would be from North Africa. Here, however, the problem seemed to be that gas reserves were remote from the sea and would require extensive and expensive pipelines for removal to sea ports. However, pipelines were already under construction from Hassi R'Mel to Algiers and Oran.

Consumption

It was important to consider areas for consumption. The United States was being converted to natural gas on a very high scale. This had resulted in the construction and operation of many pipelines throughout the country. However, the United States was unique in that it was not only the consumer but also the producer of gas. For this reason it was an internal situation which resulted in a rather high price for the gas at source, but since the transportation problem, via either pipeline or the sea, was a relatively simple one, the gas was available to the consumer at a very competitive price. The other three areas most available for the development of gas were the United Kingdom, Northern Europe and Japan. These basic considerations tended to indicate that, as previously mentioned, the factors of transporting these gases by sea would certainly develop tremendously during the next decade. Since the United Kingdom and Japan were highly industrialized and populated insular countries, it was apparent that the importation of gas would be via the sea.

One of the most striking properties of gas, particularly methane, was that the relative volume of liquid (at boiling point) to gas (at 70° F.) was very great, or 630 in the case of methane. This was what made liquefaction very attractive. However, the liquefied gas was still very light or about 26 lb. per cubic foot for methane compared to 64 lb. per cubic foot for sea-water. This made the size of storage vessels or ships relatively large when compared to the storage vessels or ships for other liquids.

Liquefaction of gas could be accomplished with the aid of pressure; the higher the pressure, the higher the boiling point. For example, normal butane could be liquefied at 100° F. if the pressure was raised to 37 p.s.i.g. and propane could be liquefied at 100° F. if a pressure of 175 p.s.i.g. was employed. However, no matter how high a pressure was exerted on it, methane could not be kept in a liquid state if its temperature exceeded –116° F. or 148° of frost. Therefore, it was seen, that if methane was to be stored under great pressure and a low temperature of –116° F., the resultant mechanical



Original dimensions :	
Length overall	338ft 8½in
Length between perpendiculars	320ft
Breadth (moulded)	50ft
Dimensions after conversion :	
Length overall	338ft 8½in
Length between perpendiculars	320ft
Depth (moulded)	29ft ¾in
Draught (moulded)	18ft
Deadweight (approximate)	5100 L.T.
Main propulsion	Diesel
Depth to upper deck in way of tanks	41ft
Horsepower	1700 at 180 r.p.m.
Service speed (approximate)	9 knots
Design draught	15ft 6in

Liquid methane carrier, M.V. "Methane Pioneer."

and refrigeration problems were far greater than if the methane was stored at atmospheric pressure and –259° F. In the case of the other hydrocarbon gases such as propane and butane the temperatures were relatively not far from ambient, so that storage was normally under pressure with only slight refrigeration necessary.

One of the very great advantages of methane as a domestic fuel as compared to propane, butane or manufactured gas was that it was lighter than air, allowing it to rise in the atmosphere and reduce explosive dangers. Natural gas was also non-toxic as compared to manufactured gas, making loss of life possible only by suffocation.

But safeguards had to be provided in the storage of such a cold liquid as liquid methane. The heat of vaporization of such a liquid was far higher than most liquid gases, meaning that a relatively high amount of heat must be provided to vaporize the liquid. When the No. 4 tank in Cleveland ruptured in October, 1944, the dynamic on-rush of 935,000 imperial gallons of liquid quickly overran a low dyke (equivalent in volume to the volume of the tank), then spread into the immediately adjacent laboratories, plant, and residential areas. The frigid liquid rapidly ran down adjacent streets and into sewers, freezing everything in its path and it subsequently vaporized and exploded with flames rising half a mile in the air. The resultant loss of life was 128 persons and the property damaged exceeded $6,000,000. Therefore, in any shore or ship installation, adequate safeguards must be made to contain the liquid in the event of tank or system failure.

Turning to the design of ships suitable for the carrying of liquid natural gas, Mr. McMullen said that ship design was advancing rapidly. There were three possible choices for liquid methane carriers. First, a converted dry cargo ship; second, a converted tanker; and third, a newly constructed special type tanker. It was well known that a ship constructed for a specific use was usually cheaper in the long run than a converted vessel. The author referred to the conversion of a standard American tanker, the T-2 type, built during the Second World War. In this conversion, which was carried out by Mr. J. D. Crecca, special tanks were housed in rooms made out of the eight centre and two forward cargo tanks. The over-all carrying capacity amounted to 147,200 c.ft. of liquid methane at a temperature of –258° F. and at atmospheric pressure. A new double bottom in the base of the old cargo tanks, and installed below the new methane tanks, provided, together with the original wing tanks, space for 9,620 tons of oil cargo. The estimated price for this limited conversion during 1955 was $3,600,000. Basically the same idea was used in the conversion of the *Methane Pioneer* (jointly owned by the Gas Council of Great Britain and Constock International Methane Ltd., of

the United States). This ship, originally a C1-M-AV1 machinery aft, small, dry cargo ship, was converted by "gutting" the inside of the original holds by eliminating all decks and building steel and aluminium integral insulated rectangular tanks, covered by a new raised main deck.

In his concluding remarks, M. McMullen said it was evident that as the highly industrialized nations expanded their production and population, the consumption of and demand for energy fuel would rise. Unfortunately the nations in Northern Europe and Japan did not have the natural resources for the fuel with which this energy was to be produced. Therefore, greater and greater importations of economic fuels would become necessary. Natural gas, a clean and desirable fuel, because of the vast quantities available and presently being wasted was destined to become one of the primary sources of energy.

Liquefaction and storage of natural gas was a proven operation. The transportation of natural gas by-products by ship, such as L.P.G., had already become a commercial fact and the carriage of liquid natural gas, though experimental at the present time, was already a fait accompli. Designs for large methane-carrying vessels were already on the drawing boards and detailed studies were being completed for the most applicable trade routes.

Like any totally new type of ship, developmental work for this complicated class of vessel required a great deal more time and effort relative to existing normal types. However, the concept had been proved and many of the interested parties who had been waiting for the result of this test were now moving ahead with definite projects. Experience of operation would count very heavily in any operation of this sort and experience was basically a factor of time.

New building for a specific application would produce the best end-result, but a conversion should have a limited economic advantage for a beginning.

Traditionally the shipping industry had been lethargic and conservative, which had resulted in feast-and-famine, bust-and-boom building and operating cycles. Such an approach to the building of liquid methane tankers could well prove disastrous, but this could easily happen if everyone sat back, waited for two or three parties to conclusively prove the large revenues obtainable and then all climbed on the bandwagon at once. Crash programmes did nothing more than inflate the cost of normal developments.

For these reasons he recommended that those parties who had been interested in the economically attractive transportation of natural gas, now move ahead with the required development work.

New Companies

The accompanying particulars of New Companies recently registered are taken from the Daily Register compiled by Messrs. Jordan and Sons Ltd.

Polo Refrigeration & Electrical Appliances Ltd. Secretary: G. W. Thomas. Nominal capital: £300. Directors: Howard R. Harper, 2, Station Road, Crewkerne, Somerset; Mervyn T. Harper, 53, Furland Road, Crewkerne, Somerset. Solicitors: Marsh Warry and Arrow, Yeovil. Registered by Solicitors' Law Stationery Society, Ltd.

Bland Refrigeration Co. Ltd., Hermitage Works, Church Terrace, Red Lion Street, Richmond, Surrey. Secretary: Phyllis Bland. Nominal capital: £5,000. Directors: Gerald C. S. G. Bland and Phyllis Bland, 26, Kingston House East, Princes Gate, S.W.7. Registered by Shaw & Sons, Ltd.

Elite Refrigeration & Electrical Co. Ltd., 60, Rosemary Road, Clacton-on-Sea. Secretary: C. E. Mockford. Nominal capital: £5,000. Directors: Ivy L. Mockford and Charles E. Mockford, both of 1-3, Edith Road, Clacton-on-Sea. Registered by Shaw & Blake Ltd.

Coolflow Ltd., 77, Hanson Street, W.1. To carry on business of manufacturers of and dealers in refrigerating and cold storage machinery, plant, etc. Nominal capital £100. Director: Trevor E. Thomas, 15, Devonshire Road, N.W.7. Registered by W. Kybert & Son, Ltd.

Coldcraft Industries Ltd., 97, Peckham Road, S.E.15. To carry on business of manufacturers of and dealers in insulated equipment for refrigeration purposes, etc. Nominal capital: £1,000. Directors: William D. Haynes, 147, Gibsons Hill, S.W.16; Arthur W. Orengo, 65, Southend Road, Beckenham, Kent. Registered by Solicitors' Law Stationery Society, Ltd.

Manchester Patent Ice & Cold Storage Co. Ltd., 10, Nether Street, Manchester, 12. Secretary: L. P. Ryder. To take over business of cold storage proprietors and ice manufacturers carried on at Manchester by a company of same name (in liquidation), etc. Nominal capital: £25,000. Directors: Alfred Ryder, Hillside Farm, Greave, Romiley, Cheshire; John E. Ryder, 31 Elms Road, Heaton Moor, Stockport, Cheshire; John F. Ryder, Peter Ryder, Lawrence P. Ryder and Percival Kelsall. Solicitors: O. Collier Littler and Kilbeg, Manchester. Registered by Shaw & Sons.

Sherwood Engineering Co. Ltd., Sherwood Works, 62, George Street, Wakefield. To carry on business of manufacturers of and dealers in refrigeration units, etc. Nominal capital: £500. Directors: Alwyn Isherwood, "Fairacres," Pontefract Road, Ackworth, Yorks (ch); Thomas C. Batson, 40a, Northgate, Wakefield; Donald Field, 151, Mardale Road, Horton Banktop, Bradford. Solicitors: Chalker, Mosby and Hick, Wakefield. Registered by Jordan & Sons, Ltd.

P.S. LOW TEMPERATURE GROUP

A paper on "High Field Magneto-Optical Effects at Low Temperatures," will be given by Dr. J. A. Hulbert at a meeting of the Low Temperature Group of the Physical Society on April 13.

MINISTER TO OPEN E. E. EXHIBITION

The Ninth National Electrical Engineers Exhibition, to be held at Earls Court from April 5 to 9, 1960, will be opened by the President of the Board of Trade, Mr. Reginald Maudling.

BOOK REVIEW

HANDBUCH DER KAELTECHNIK, VOL. III, VERFAHREN DER KAELTEERZEUGUNG UND GRUNDLAGEN DER WAERMEUEBERTRAGUNG. (Handbook of Refrigeration Vol. III, Cold Generation Processes and Fundamentals of Heat Transfer). By H. D. BAEHR, E. HOFMANN and R. PLANK. 511 pp. Large Octavo with 380 diagrams and illustrations, 62 tables in text, and 14 tables in appendix. Julius Springer, Berlin. D.M.84.

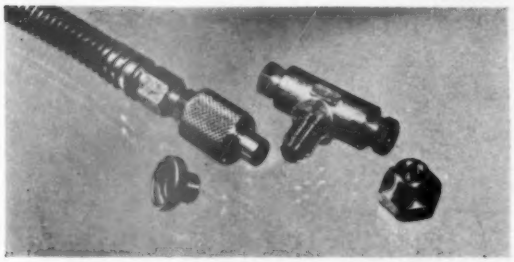
This, the third in a series of 12 volumes, is in two self-contained parts.

The first part deals with the various processes for the production of low temperatures, thermodynamic on the one hand, electric and magnetic on the other. Closed cycle and open thermodynamic methods are analysed in a systematic review, problems being dealt with in other volumes in the series. The fundamentals of Peltier effect, thermocouples and semi-conductors are expounded, and their utilization in approach to the absolute zero. These methods at present little trusted by practicing engineers are shown to open up unforeseeable possibilities in the future.

The second part is a treatise on the theory of heat and mass flow as well as convection, conduction and radiation, references to other relevant works on these subjects being given. The simplification of intricate problems by the use of Reynolds, Prandtl, Nusselt and other dimensionless numbers is repeatedly demonstrated with a large number of diagrams over a wide temperature range with many substances.

Representation of many problems on a common basis assists in their application in the field of refrigeration, and diagrams provide a handmaid facilitating exact mathematical treatment.

Constructional forms of the apparatus involved will be given in volume VI of the series and sorption refrigeration plant and equipment have been dealt with in volume VII already published.



New R.C.L. Equipment

A new series of valves and accessories for use in the re-charging of hermetic units is now being marketed by Refrigeration Components Ltd., 1–2, Greycoat Place, London, S.W.1. These valves, which are of the centre pin variety similar to those used on car tyres, are attached to the refrigerator unit with a patented gripping device which expands the tube ends into the necks of the two valve outlets. When the specially designed lead from the re-charging unit is screwed on to the valve inlet, the pin is depressed. When the re-charging operation is completed a protective cap is screwed on to the valve inlet.

The M. J. Kelley Company, 17006 Kinsman Road, Shaker Heights 20, Ohio, have informed the British consulate-general at Cleveland that they are interested in obtaining United Kingdom sources of supply of pipe, valves and fittings, in copper, steel, cast iron, aluminium and stainless steel. They wish to purchase in sizeable quantities for stocking at their Cleveland warehouse. The United States firm are also willing to negotiate with any United Kingdom concerns seeking outlets in the Cleveland area for ventilating and air-conditioning equipment. The M. J. Kelley Company, who are now operating in their 35th consecutive year, are contractors' engineers specializing in plumbing, heating, industrial piping, ventilating and air-conditioning. They do principally commercial, industrial and public works. The Ohio concern are considered to be a suitable connection for United Kingdom firms.

ALFRED PORTER EXPANSION

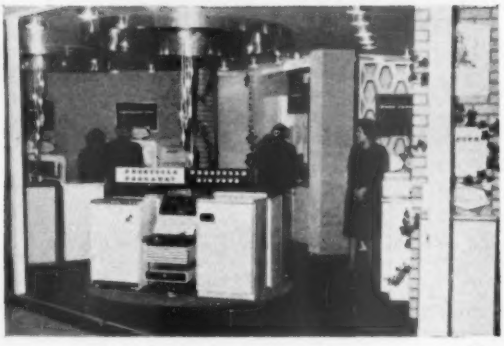
(*continued from page 269*)

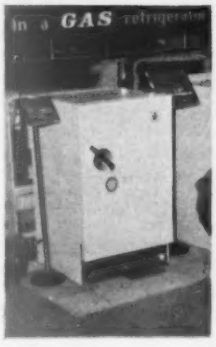
with maximum heat-transfer capacity within the smallest possible dimensions. A notable example of the latter is the partially flooded "Raceway" system wherein the cooling coils are interlaced. After the death of Mr. Porter in 1958, a new association with the Industrial Refrigeration Company Limited, gave the company access to the wealth of technical experience of the American firms within the group. Among the first-fruits of the link-up was the incorporation of compressors perfected and proven over many years. With the best available technical know-how on both sides of the Atlantic to call on, the Teddington firm has recently been manufacturing and installing equipment of the most modern design.

Today, the trend within the company is towards the completely self-contained unit. This is a nominal 50-ton water chilling plant designed to Oil Companies' Materials Committee Specification. It is a complete entity, with in-built chilled and condensing water piping and pumps and a multi motor control panel. It thus requires only the connections of the water services and a power supply to the main isolator to bring the machine into immediate operation.

This unit is 11 ft. 10 in. long by 4 ft. wide, and 6 ft. 6 in. high It produces cooling water from 52° to 42° F. when provided with condensing water at 95° F. flow per 108° F. return. The compressor is of six-cylinder V/W construction, with 4½-in. bore by 3½-in. stroke directly driven at 980 r.p.m. Capacity control is by cylinder unloading to 66⅔ and 33⅓ per cent. full load duty. All electrical equipment is rated for an ambient temperature of 120° F. with Class "B" insulation. All necessary safety controls are incorporated integrally in the instrument control panel. In addition to the normal high and low pressure safety controls these include a low limit safety thermostat, oil safety pressure differential switch, and water flow safety pressure switch.

The Ideal Home Exhibition





Some of the refrigeration makers' stands photographed by "M.R." on the opening day: Electrolux; English Electric; Kenwood; Kelvinator; Prestcold; Main (Thermcold model on Gas stand); Hotpoint.

EXPANSION AT KELVINATOR

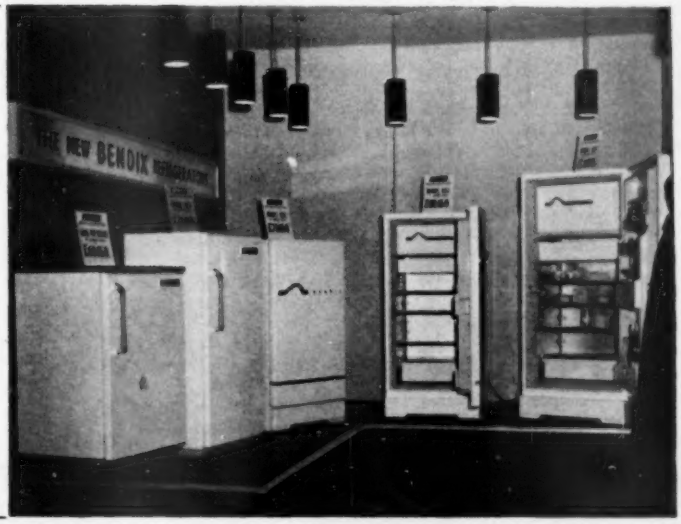
KELVINATOR Ltd., expanding their domestic and commercial divisions, announce new executive appointments, and an accelerated production programme. To meet the resulting heavily increased material requirements, Mr. G. F. Eden has been appointed executive director (materials) and will have full responsibility for co-ordinating the procurement and movement of materials.

Mr. Duncan Welch.

Mr. Duncan Welch, hitherto domestic appliance sales manager, takes over from Mr. Eden as executive director (sales). In this capacity Mr. Welch will be responsible for all sales and service in the United Kingdom and he joins the executive board.

Mr. Derrick Spanton has been appointed sales manager, (domestic appliances) in place of Mr. Welch, and Mr. Eddie Dowsing becomes contracts manager (domestic sales). Mr. Dowsing will be responsible for main London stores accounts and central buying offices.

The new Kelvinator commercial policy will result in increased emphasis on merchandizers, sealed units and ice-cream cabinets. Developments in the commercial division, which continues to be headed by Mr. A. Robinson, will give maximum effect to this new sales policy. To release distributors from the restrictions created by an exclusive commercial franchise, Kelvinator have cancelled existing agreements. The company is very pleased to announce that distributors are supporting these expansion plans, thus retaining the existing national service coverage, which new dealer appointments will further strengthen.



These first Bendix machines to be shown to the public are on display at The Ideal Home Exhibition, London.

NEW ELECTROLUX SALES DIVISION

A new sales division has been formed by Electrolux Ltd. to cover the South Wales area. The divisional office is at 60 Newport Road, Cardiff (Tel. Cardiff 30846).

The manager of the new division is Mr. David F. Ireland, formerly deputy divisional manager of Electrolux Ltd.'s Western division whose offices are at Bristol. His deputy divisional manager is Mr. Percy A. Bates, formerly an area manager in the Company's Western division.

Mr. Ireland, who is aged 41, joined Electrolux in 1953 as an area manager in its Western division and was promoted a deputy divisional manager in 1956. Before joining the Company he was a metallurgical chemist in the steel industry. During World War II he joined the Welsh Regiment and was commissioned later in the Royal Welch Fusiliers. He was awarded the Military Cross in Italy, and served finally in the North Staffordshire Regiment.

* * *

Refrigerators were on show at the Consumer Goods Fair, first held in Utrecht, Holland, from February 29 to March 5, as part of the Utrecht International Spring Fair. Some 3,000 firms from 25 different countries participated, and the exhibits occupied a net space of 65,000 square metres.

DOMESTIC REFRIGERATION

ELECTROLUX APPOINTMENTS

MR. ROBERT J. MANT, formerly deputy divisional manager of Electrolux Ltd.'s London division has been appointed to the general sales manager's staff at the company's head office, 153/5 Regent Street,

Mr. R. J. Mant.

London, W.1. His successor as deputy divisional manager is Mr. Ronald D. Lewis, who was formerly an area manager in the London division.

Mr. Mant, who is aged 47, joined Electrolux Ltd. in 1950 as an area manager, and was promoted deputy divisional manager in 1954. He began his career in 1927 in the electricity department of Ilford Borough Council and was later appointed as a showroom assistant. In 1934 he joined the South Metropolitan Electric Light and Power Company as a showroom manager, to which

Mr. R. D. Lewis.

position he returned after war service in the Royal Navy.

Mr. Lewis joined Electrolux Ltd. in 1953 as a contracts area manager with its Scottish division, and afterwards transferred to the Company's Eastern division. On leaving school Mr. Lewis joined the Royal Air Force and served throughout the war as a night fighter pilot. He began his business career, after the war, as an administrative assistant with the British Petroleum Co. Ltd. in Britain and in Palestine and then became a sales representative with Ofrex Ltd. and later with J. & E. Atkinson Ltd.

FROSTAIRE EXHIBITION AND SALE

MORE than 2,000 people visited an exhibition and sale held by Frostaire Ltd. at its headquarters, Refrigeration House, 115, Alexandra Park Road, Muswell Hill, London, N.W.10 on February 24 and 25. On display were 66 cabinets ranging from the smallest low temperature storer to the well-known Marco Majestic unit with a capacity of 16 c.ft. Business during the event, it is understood, exceeded £4,000 and enquiries made during the two days are still being dealt with.

Units on show included two new cabinets, the Fairview Janitor and the Junior, of 12 c.ft. and 8 c.ft. capacity, respectively. Both these models which are of the divider plate variety, are designed so that they can be mounted on a counter or a window bed, refrigeration being provided by a remotely situated condensing unit. Another cabinet which attracted much attention was the Wilmot Deep-freeze. Considerable interest was taken in a number of Swedish cabinets, particularly the new 405 Iwo automatic defrost model which incorporates a system which evaporates defrost water thereby dispensing with drip trays and drainage.

Twelve open topped Kelvinator self-service units were sold within two hours of the opening of the exhibition ; they were offered for sale at nearly £100 below the usual list price.

GAS REFRIGERATORS

As part of a series of supplements sponsored by the Gas Council, which is dealing with the uses of gas in the home, an item on gas refrigerators appeared in a recent issue of the *Architects' Journal*.

After outlining briefly the principles of absorption refrigeration, the article says that gas-operated units are available in three types ; free standing, built-in, and built-in at eye level. Free standing models range from 1·7 to 7·6 c.ft. capacity. Built-in models come into the 1·7 to 2·7 c.ft. range. Flint lighters are provided for easy ignition and special ducting arrangements are incorporated to permit free flow of air across the unit and to dispose of the flue products at the end of the appliance.

On the siting of gas refrigerators, the article says that they should not normally be placed in closed spaces such as larders or cupboards because of the lack of ventilation.

To install the appliance, states the article, a connexion must be prepared with the refrigerator out of position, and completed once it has been sited. A gas cock should be applied to the installation as one is not normally supplied to the refrigerator itself. When access is possible from below the supply can be run and the control cock fitted underneath the cabinet, provided that the cock is in easy reach. If this is difficult or if access from below is not possible, the cock should be fitted externally on the supply near the refrigerator. If necessary the supply must be run to a point adjacent to the appliance and another run back from it : the two supplies are then connected by the cock after the refrigerator has been placed in position.

NEW TABLE MODEL ASTRAL

A 33⅓ per cent. increase in cubic capacity and luxury door fittings are important features of the new Morphy-Richards " Astral " table model refrigerator. New techniques in design and production have made possible the competitive retail price of £36 15s. (net list £30 19s. 6d., plus £5 15s. 6d. p.t.) This new table refrigerator, A.200A., has a cubic capacity of 2 c.ft. with a shelf area of 4·2 sq. ft. It replaces the highly successful 1·5 c.ft. table model, BM/E, (with a very slight increase of only 23s. in the retail price). The new model is equally compact in design with almost identical external dimensions—height 25½ in., breadth 21¼ in., and width 21¼ in. A set of contemporary-styled legs, retailing at 29s. (p.t. free) converts the new model into a free-standing refrigerator.

Other new features include interior door-fittings—a large butter rack with perspex sliding doors, a rack for eggs, and a third rack for other dairy produce and some bottles and jars. The evaporator unit, which contains two ice-trays, making 24 cubes (1·1 lb. of ice), can also be used to store up to 5 lb. of frozen foods.

" ARCTIC " REFRIGERATORS

A NEW range of refrigerators, the Arctic, is now being introduced to the retail trade. Manufactured on the Continent, the Arctic is being distributed by Kingsgrove Ltd., 101-109 Ladbroke Grove, London, W.11.—an associate company of Advance Sewing Machines Ltd.

The " 2.5 " model of the new " Arctic " range.

The Arctic range will finally comprise six refrigerators of which three are now on sale.

The existing models are all equipped with sealed Tecumseh compressor units which are guaranteed by the distributors for five years. All are steel framed and with exterior steel surfaces finished with special Duco lacquer. An acid resisting interior shell is common to all models.

All movable parts of the refrigerators are guaranteed for one year.

The range comprises the following models :

Arctic 2·5.—2½ c.ft. approximately, absorbtion type ; retail price 47½ gns. including tax. It has a compact freezer compartment, two big storage shelves, a half shelf, butter cooler, cheese holder, removable bottle racks in the door, egg rack, 15-cube ice tray, internal light, and a plastic work top.

Arctic 4·5.—4½ c.ft. approximately, compressor type ; retail price 66 gns. including tax. Height 37 ins., depth 21 ins., width 20 ins. It has a big freezer shelf, three big storage shelves, butter cooler, cheese holder, bottle rack, salad and vegetable tray, egg rack, 18-cube ice tray and internal light.

Arctic 5.—5.0 c.ft. approximately, compressor type; retail price 69 gns. including tax. Height 35 ins., depth 25 ins., width 23 ins. It has a big freezer shelf, three big storage shelves, 6 in. deep salad and vegetable container, butter cooler, cheese holder, egg rack, 24-cube ice tray, internal light, plastic work top and bottle rack.

The " Arctic " Console type refrigerators of approximately 8 c.ft. ; 7·7 c.ft. ; and 6 c.ft. are now being delivered to this country.

" EVEREST " DISTRIBUTION

Although distribution of " Everest " products including domestic refrigerators is exclusively through wholesalers, Merseyside Engineering announce that they are at present in the course of engaging a special sales promotion force of about 40 men to call on dealers direct. This team will demonstrate the strong selling features of " Everest " appliances, supply publicity material, and arrange dealer " tie-ups " and demonstrations. The new venture will ensure, on a nation-wide scale, the physical introduction, distribution and service of " Everest " products. Television is to be used on a national scale over a period of six weeks in April/May, when regular 15 and 30 commercials are to be shown at peak-times on all networks. The films will emphasize the main selling features of this year's range of " Everest " refrigerators Biggest selling points include the fact that dimensions have been carefully planned to suit British kitchens and to line up with existing British standard kitchen equipment. An example of this is the Everest " 375 " in dimensions of 36 in. high by 22 in. wide by 22 in. deep, yet with a capacity of 3¼ c.ft. Another important point is that no installation charge, service fee or other extra charge is made to the public during the guarantee period, as " Everest " refrigerators are delivered complete with all accessories.

YORKSHIRE FIRM REORGANIZED

Alwyn Isherwood (Refrigeration) Limited is the title of one of the six Isherwood companies based on Wakefield and operating throughout the West Riding of Yorkshire. It has recently had a complete reconstruction of its sales department owing to its rapid expansion. Mr. Horace Robinson who has risen from the position of sales representative to area manager in less than three years, has been

appointed general sales manager of the company and will pursue the same vigorous sales policy on a company basis as has made his area so successful during the past twelve months. Mr. F. Bird has been appointed area supervisor in Leeds, and Mr. E. Ardron area supervisor in Sheffield, and there is no doubt that their guidance will be of great help to the sales teams operating from those branches.

Edmundsons Supply Corporation of 240-250 Ferndale Road, London, S.W.9, last month announced their "Sivia 31" portable refrigerator; it operates on mains electricity or batteries and will fit into car, caravan or boat. Of 1·25 c.ft. capacity, it weighs 32 lb. and is 18-in. high. The Sivia is made in Luxembourg.

P.S. LOW TEMPERATURE GROUP

A paper on "Some Low Temperature Experiments on the Alkali Metals," will be given by Dr. H. M. Rosenberg at a meeting of the Low Temperature Group of the Physical Society on February 10. At a meeting on April 13, Dr. J. A. Hulbert will deliver a paper on "High Field Magneto-Optical Effects at Low Temperatures."

MR. FRANK FIELDS IN NORWAY

During January, a refrigeration conference was held in Oslo/Norway, promoted by Mr. Lai Berg. This gentleman represents various manufacturers: Sterne (Tecumseh), Kenmore Products, Contardo and Ranco. Lectures were given in the mornings and afternoons with a lunch break and the attendance averaged 150 per session. Mr. Bruce McLaren of Sterne's and Ranco's Mr. F. Barker gave two lectures each, leaving one each for the other two gentlemen. Mr. McLaren was accompanied by Mr. W. R. Houston and Mr. C. McVey, while Mr. Frank Fields brought up the Ranco contingent. On the final evening there was a reception and dinner and the whole of the visitors were full of enthusiasm for the success of the conference. During the course of the dinner there was the usual speech-making and Mr. Fields was prevailed upon by his British friends to toast the Norwegian refrigeration industry. During his remarks he coupled his congratulations with the name of the Institute of Refrigeration, which was very well received.

LATEST ITALIAN ARRIVAL

The "General" refrigerator range of from 5 to 9 c.ft. capacities was introduced last month to the British market by General Refrigeration Limited, 39, Beak Street, London, W.1.

Mr. Denys King-Farlow, a trustee of the new Mermaid Theatre in the City of London, and his wife, Margaret, live on top of their job. Their permanent home is in the 43 tons sailing barge "Henry" moored on the Thames in Puddle Dock, adjacent to the theatre. Among the many aids to comfort with which their water-borne home is equipped is this Electrolux refrigerator in Mrs. King-Farlow's "galley."

Book Review

THE ENGINEER BUYERS GUIDE 1960 EDITION. 975 pp. The Engineer, 28, Essex Street, Strand, London, W.C.2. 9s. 3d. (free to all subscribers to The Engineer).

The 1960 edition of this widely used work of reference conforms to the usual high standards of content and orderly layout. The main section of the book consists of 768 pages containing over 34,750 entries arranged under approximately 2,650 classified headings, with 1,600 cross references to help the user find what he wants. The fields covered are chemical plant, electrical equipment, engines and engine parts, machine tools, machine tools accessories and attachments, and sheet metal working machinery.

This edition also contains details of forthcoming engineering and industrial exhibitions; associations, institutions and societies connected with the engineering industry; national undertakings; full details of companies and organizations including addresses telephone numbers and telegraphic addresses; United Kingdom agents for foreign firms; and trade names.

STAN POLLARD RETIRES

All in the "commercial" side of the industry will wish a happy retirement to **Mr. Stan Pollard** who has just terminated a 34-year association with Frigidaire's of Hendon. In 1929 he was appointed London service manager and assistant general service manager. Four years ago Stan Pollard was seconded to Mr. Porter's personal staff dealing with special assignments, and in that capacity he has been mentor and magician all rolled in one.

A Mobile Bottle Cooler

A rigidly constructed, self-contained mobile bottle cooler of light appearance and compact design, provides the catering and licensed trades with an efficient means of serving cooled beverages at their most palatable temperatures. These coolers have been specially made by Lightfoot's.

Two-Language Congresses

To The Editor, Modern Refrigeration,

Sir,—I have just read Dr. J. C. Fidler's contribution to the 1960 Year Book of the National Federation of Cold Storage and Ice Trades and found it very interesting indeed. I hope he will not mind if I offer some comment regarding the value of the international congress to the "average cold storage operator" since such comment is intended to be constructive and is offered in the hope that future congresses may be made even more attractive.

I myself attended the congress at Copenhagen and I had a most worth-while experience, but nevertheless in one sense a disappointing one.

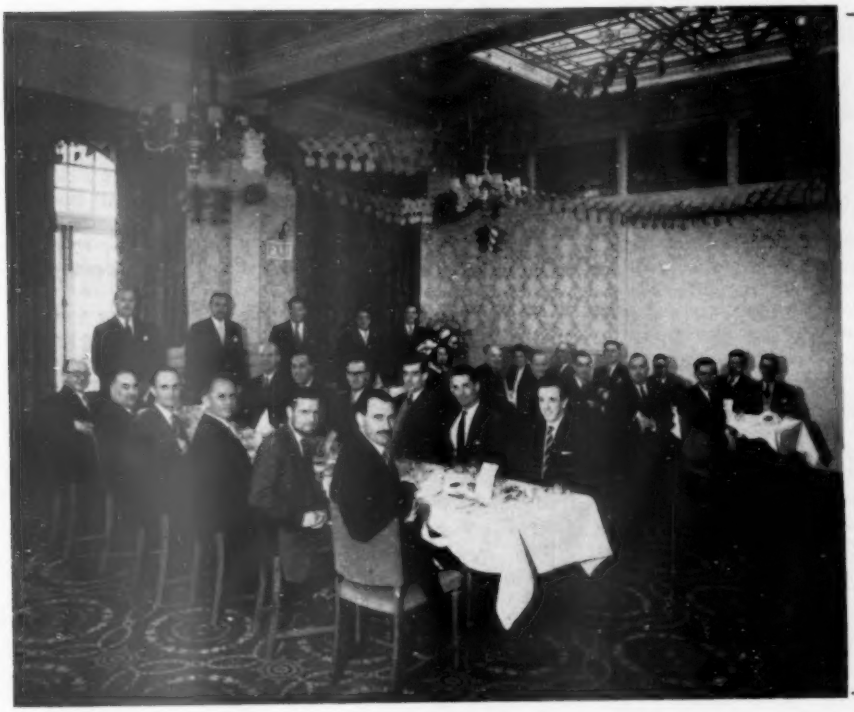
Not being bilingual, I found it impossible to follow those papers which were in French, with resultant loss of interest, not only for myself but for many others around me.

This was bad enough, but it was aggravated by the fact that commissions did not keep to the timetable, nor indeed to the order shown on the syllabus, with the result that I even missed some of the papers which were in English.

The question of order and timing of papers is surely capable of being solved, and, even allowing for the difficulty of providing instantaneous translation of other papers, I suggest that this is necessary to make any congress satisfactory.

I feel it is also necessary that the proceedings should be published in completely English and in completely French editions to be wholly worth while.

Glasgow. Yours etc., R. FINLAY.
March 1, 1960. Wm. Milne Ltd.



W. A. TAYLOR
LIMITED

★

The directors and senior executives of W. A. Taylor Limited, well-known insulation specialists of Mitcham, Surrey, recently dined together in London. This annual occasion was presided over by Mr. R. Saunders, M.Inst.R., M.R.S.H., governing director, seen standing in the centre of the group.

SHOP REFRIGERATION NEWS

By A SPECIAL CORRESPONDENT

Selfridge's

Drop Cabinets in favour of Refrigerated Slabs and Counters for Fish Selling

IT is not easy to tell to what extent the big changes now being brought about in food merchandizing methods are responsible for the evolution in the design of refrigerated cabinets. Certainly a number of them have started in the minds of the designers in ultimate collaboration with technicians, and no finnicky, dithering retailers (" We have to make up their minds for them ") have had the opportunity to express their view until they have been approached as prospective buyers of the finished job: the cabinet with all its gimmicks and gadgets complete.

Or it may happen, as in the instance of the Ross Rotor in Lewis's of Leeds, that the store co-operates by permitting the trial installation of a prototype. But possibly more frequently than is generally admitted, a cabinet is produced to conform to a retailer's design or suggestions, and, having been proved a practical proposition, is accepted as a prototype for what in due course becomes a standard product.

Take, as an example of the latter, Selfridges, where the customer is always right. This store, as a customer of the refrigeration industry, has, it seems, invariably been right in its decision to make a change in its methods of temperature-controlled display. Right, that is to say, not only as judged by Selfridge economics (increasing sales have invariably resulted) but also in refrigeration technique (precedents have invariably been created).

A few weeks ago a complete change was made in the methods of fish selling. From the long line of open-top refrigerated display cabinets* there has been a reversion back to the slab-cum-over-the-counter method of selling.

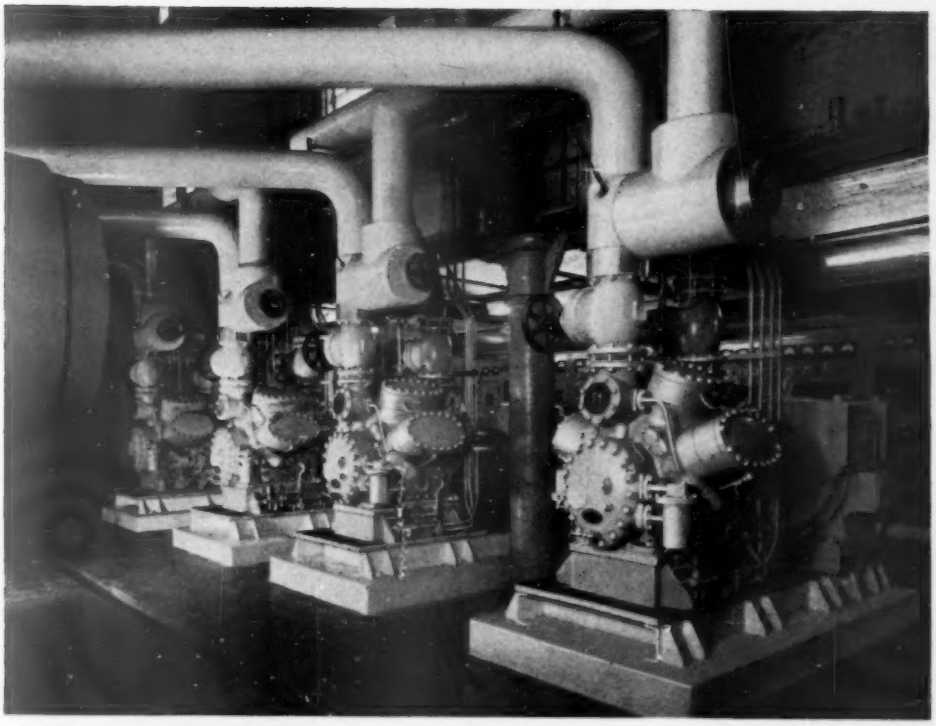
But only in a limited sense is reversion the right description. The scale and the layout of this *all-refrigerated* open display, with its alternating arrangement of counter and slab, must be unique.

It will be interesting to notice how long it remains so. A few years ago the fish trade found itself facing fork-roads in its travel towards more hygienic methods of presentation. On the one hand was the glass-covered refrigerated slab ; on the other, the

* Illustrated and described in MODERN REFRIGERATION, February 1958.

REFRIGERATION

for
manufacturing
processes



J & E HALL LTD

A Member of the Hall-Thermotank Group

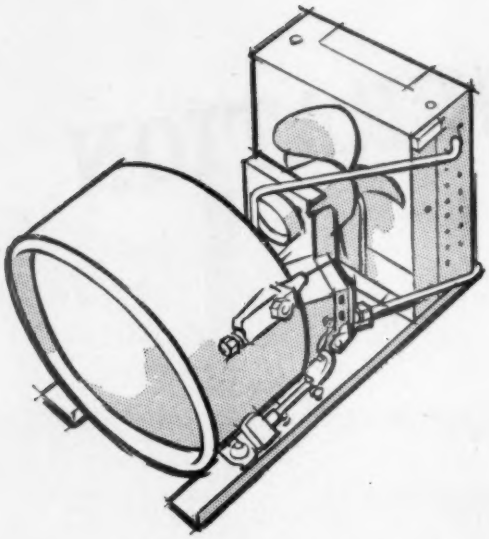
REFRIGERATION, LIFT AND ESCALATOR ENGINEERS

DARTFORD · KENT Tel: Dartford 23456

In brewing, for example, it plays a controlling part in all the processes. The illustration shows the four, 8-cylinder, 5″ x 4″ veebloc compressors, using ammonia as a refrigerant, supplied to Mann, Crossman & Paulin Ltd., Albion Brewery, London, E.C.1.

J. & E. Hall have supplied refrigerating equipment to all the leading manufacturers in the Brewing Industry.

AP 375

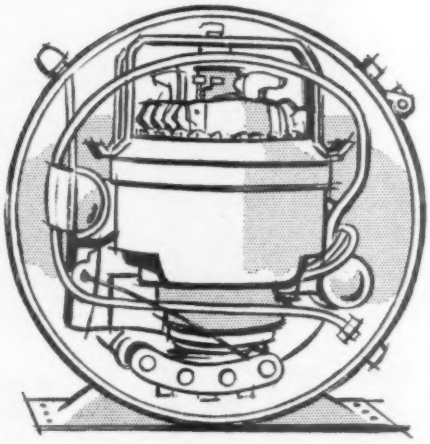


Cold commonsense calls for

KELVINATOR

—for every type of refrigerated storage and display

'Cooled by Kelvinator' is a guarantee of efficiency, economy and reliability in ultra-modern refrigeration. Kelvinator Units provide reliable refrigeration at the lowest possible cost, in a wide variety of applications. Enquiries are invited and will be answered by experienced Refrigeration Engineers.



CUT OUT THIS COUPON

MR

TO: KELVINATOR LTD., GREAT WEST ROAD, LONDON, W.4
Please send me an illustrated folder and the address of my nearest distributor.

Name.....

Address.....

.....

I am interested in refrigeration for

Display ☐

Storage ☐

Frozen Foods ☐

Cellar Cooling ☐

CVS-21

Open-topped refrigerated cabinet for the display of fish.

display cabinet. Successful but rather isolated examples of the first method are still to be found, but the principle has never become popular and an installation of a covered refrigerated slab is now a rare event. Display cabinets, while still not in general use, may be said to be relatively popular. In many shops, something of a compromise has been brought about by the use of refrigerated window or counter slabs.

The new fish department at Selfridge's now has much more of an identity and a character of its own: a self-contained shop within this magnificent food hall, its individuality is brought out first, by skilful showmanship and, secondly, by distinctive mural paintings of undersea scenes on the wall behind the serving area. One of the great advantages of the change is that there is far more scope for display, which with the present arrangement can be comprehensive and magnetic whereas, before, it was to some extent restricted in quantity and variety and, since it was not seen to such advantage from a distance, also in its powers of attraction.

The newly equipped fish department at Selfridge's.

When changes of this kind are made, the iniative is with Selfridge's own technicians and merchandizing specialists. In this instance, Mr. T. Young, O.B.E., M.I.E.E., the chief engineer, Mr. Purnell, the merchandize manager, and Mr. Lomax, fish buyer, worked in close co-operation with J. & E. Hall Ltd., who have been Selfridge's refrigeration contractors for many years.

This 36 ft. long continuous run of alternating counter and slab consists of three slabs each measuring 5 ft. 6 in. from front to back and 6 ft. long, alternating with counters each measuring 2 ft. 7½ in. from front to back and also 6 ft. long, having a combined and virtually continuous refrigerated display surface of white marble sloping from a height of 2½ ft. in front to 3½ ft. at the back of the slabs.

Immediately beneath the marble are cooling coils, and beneath the coils a 2-in. thickness of cork insulation lined on the underside with a ¼-in. thickness of plywood. Behind the marble riser running along the front is a gully running the whole length of the assembly with outlets to a drain beneath.

The structure is built on a 3-in. by 2-in timber framing supported on tubular legs giving a 1-ft. clearance of the floor.

Also running the whole length and fitted at each end is a clear glass screen made up of 3-ft. long plates held by vertical slotted bars sloping away from the customer at 4-in. from the vertical. The front and ends are faced with green laminated plastic and a rail for customers' bags and baskets runs along the front.

The compressors are housed at high level on the floor below, and stock is brought from the cold-rooms (also constructed and installed by J. & E. Hall Ltd.) by a lift, the shaft for which is centrally placed behind the serving area.

Moving Display

For the combination of animation with refrigeration, as made evident at Lewis's store in Leeds last month, we are indebted to Mr. V. Meadows, technical adviser to the frozen foods division of the Ross Group, and director of Westwick Frosted Products, Ltd.

This is a cabinet of 36 c.ft. capacity, equipped with 12 trays accommodating the packs of frozen food. The trays travel on a conveyor revolving once every 72 seconds and driven by a chain from a geared motor. The assembly includes a reserve storage chamber which can be lifted out to give access to the conveyor mechanism. A temperature of −10° F. is maintained by a ½-h.p. semi-automatic air-cooled compressor fitted with a dehydrator and solenoid valve. Automatic defrosting is achieved by built-in heaters controlled by time-switch.

Known as the Ross Rotor, the one lately seen is a prototype; but it is shortly to be put in production in the same factory that produces the Jackstone frosters.

New cabinets by Craig-Nicol.

Contemporary Cases from Glasgow

A 28-ft. run serve-over Holcold counter operating at different temperatures.

a time to

ENLARGE

your business

Modern storage methods are as important
to the enlargement of a business as up-to-date selling methods.
We are thinking particularly of refrigeration equipment.
Did you know that Mercantile Credit offer you facilities
to acquire the latest equipment out of income?
The terms are attractive. The service is efficient and friendly
and Mercantile Credit has fifty years' experience
of hire purchase finance. *Why not write*
or telephone direct to our Head Office:

MERCANTILE CREDIT COMPANY LIMITED

Argyll House, 246-250, Regent Street, London, W.1. Telephone: Regent 7222.

Member of the Finance Houses Association

There are Mercantile Credit branches throughout the United Kingdom.
Please consult your local telephone directory for your nearest branch.

DISCHIL FOOD PRESERVATION SERVICE

Now it can be told

The pioneer run using the 'DisChiL' process was made in September, 1959. Since then many trial runs have been successfully completed covering such diverse products as scampi, poultry, sponge cakes, fish, meat and frozen foods of all types.

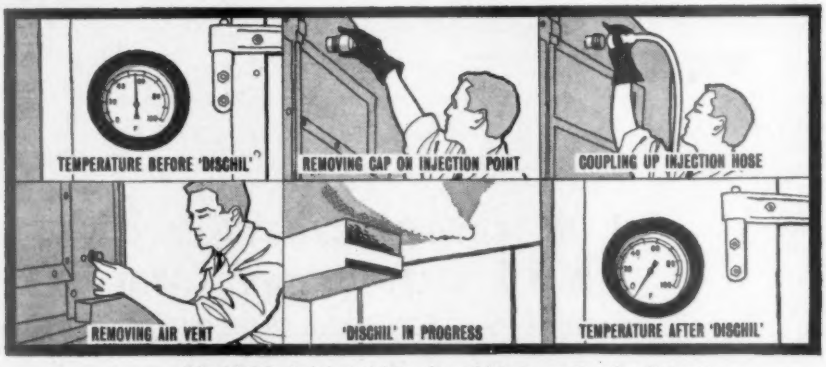
The data from these trial runs is now available to you through:—

THE DISTILLERS COMPANY LIMITED - CHEMICAL DIVISION

Carbon Dioxide Department, Devonshire House, Piccadilly, London W1. Telephone: Mayfair 8867

DISCHIL FOOD PRESERVATION SERVICE

This service offers a means of rapidly reducing the temperature of insulated road or rail containers or of mechanically refrigerated vehicles. It can be used before or after loading and ensures that your goods travel in a bacteria free atmosphere and arrive in optimum condition.



Liquid CO_2 is injected into the vehicle normally after it has been loaded. Very rapid heat extraction from the vehicle shell and contents takes place and the desired operating temperature is reached in a few minutes.

TA.3331

The Institute of Refrigeration Bulletin

Institute Headquarters: New Bridge Street House, New Bridge St., London, E.C.4 (CENtral 4694)

APRIL MEETING

The meeting of the Institute to be held on Thursday, April 7, 1960, at the Institute of Marine Engineers, The Memorial Building, 76 Mark Lane, London, E.C.3, will be a joint meeting with the Low Temperature Group of the Physical Society. At the meeting, Mr. J. D. Gurney, B.SC., associate member, will present a paper entitled "Some problems associated with the use of a high-speed reciprocating compressor for aircraft cooling projects."

Mr. Gurney's paper commences by briefly discussing the basic design requirements which must be followed by the designer of aircraft cooling equipment, together with fundamental problems of space and environment. Illustrations of the installation difficulties are given; since the components must be designed for maximum performance within a very restricted space envelope, with the necessity also to keep the weight as low as possible, a relatively low equipment working life must be expected. Environmental conditions are extreme in temperature, which also fluctuates rapidly, and variation in ambient pressure must have no effect on efficiency of operation and control.

The design of a small oil-free reciprocating compressor is described, together with some of the difficulties encountered in production and development. Other components of an aircraft system are discussed, and the problems of operation and control of a refrigeration system in an aircraft are explained; rapid changes in evaporator air temperature, condenser coolant temperature, and component environmental conditions make it difficult to prevent migration of refrigerant from high to low side of the circuit, and steps must be taken to prevent condensation of liquid at suction inlet or inside the compressor.

The vibration experienced, together with the variation in ambient pressure, make it necessary to design special refrigeration control valves, some of which are described.

Other applications for the equipment are discussed, notably on ground servicing equipment, which must also be oil-free to match the airborne system.

MATERIALS HANDLING CONFERENCE

A two-day conference on materials handling, organized by the Willesden and Hendon Productivity Committee in conjunction with the Institute of Materials Handling, is to be held at Willesden Technical College on March 22 and 23, 1960. The conference has the object of drawing attention to up-to-date methods and equipment, and to show how materials handling can reduce costs, reduce waste and increase productive capacity.

INTERNATIONAL INSTITUTE OF REFRIGERATION

The constantly increasing activity of the International Institute of Refrigeration, as shown by the many meetings of the scientific commissions, and the frequency with which its advice is sought by other international organizations, has resulted in a very great volume of work for the director, Monsieur R. Thévenot.

This pressure of work has led the executive committee of the I.I.R. to recommend the appointment of an assistant to Monsieur Thévenot. Because the two official languages of the Institute are French and English, it is thought desirable to appoint someone whose mother tongue is English.

The post will be permanent, with headquarters in Paris; the person appointed should have a working knowledge of French. He should have a recognized engineering qualification, with experience in some branch of refrigeration.

Anyone interested, and who would like further information, is asked to write to the secretary, U.K. Committee of the International Institute of Refrigeration, Department of Scientific and Industrial Research, Charles House, 5 - 11 Regent Street, London, S.W.1.

POLYURETHANE FOAMS

ADDRESSING The Institute of Refrigeration at the February sessional meeting, Mr. J. M. Buist and Mr. R. Hurd, Imperial Chemical Industries Limited, described the manufacture of polyurethane foams by reacting suitable chemicals. The authors then proceeded to detail the characteristics of these materials which enable them to make a useful contribution to the field of heat insulation.

"The increasing demand for thermal insulation in industry has encouraged the development of a considerable range of products designed for insulation purposes," declared Messrs. Buist and Hurd. "The problems of completely filling hollow walls, floors and ceilings or of covering pipes, tanks or other vessels for industrial or domestic use are considerable. For efficient insulation the circulation of air in the medium must be reduced and eliminated as far as possible. Since air is one of the most efficient insulators as long as it is kept in place and not allowed to circulate, it is natural that foam materials in which the air is contained in closed cells should make very satisfactory insulants. Some of the desirable properties which have to be considered when choosing an insulant to meet the conditions of both refrigeration and high temperature insulation are—low water absorption, low

density, resistance to settling, resistance to fire, low thermal conductivity, resistance to rotting and odour, low thermal capacity, good compressive strength, adequate maintenance of these properties at the temperatures of operation and, of course, price. Other factors which also have to be considered are ease of installation, ease of maintenance and cleanliness. In both low-temperature and high-temperature insulation the economic insulation thickness has to be determined ; if this is judged to be the point where the cost of insulation added to the cost of heat lost is at a minimum, the factors which have to be considered are the quantity of heat lost, the hours of operation per year, the cost of heat, the cost of installation of insulation, the cost of maintenance, and the period of depreciation. The basic information required by insulation engineers to enable them to assess the value of urethane foams is available now, and an ever increasing collection of service data is being accumulated. Various large-scale trials and installations have been carried out in I.C.I. factories over a number of years and the results of some of these trials are now summarised.

" For example, at the Imperial Chemical Industries Limited's Hillhouse factory a section of the carbon dioxide plant was insulated with rigid urethane foam rather than cork because it was desirable to reduce the shut-down time on the plant. This work with the *in situ* foaming technique was carried out at the beginning of 1958 and showed that many types of structure could be insulated at a much greater speed than was possible when installing the older conventional insulants. Another example from bulk experience concerned the insulation of the enormous headers of the largest single span cold store in Europe. The header bank measured approximately 16 ft. by 20 ft. by 4 ft. and contained many hundreds of pipes and 53 valves. Because of the great difficulty of access to some of the pipes, insulation by normal techniques would have been extremely difficult and lengthy. An outer shutter was constructed and the whole area of pipeline was encased in polyurethane foam applied by foaming-in-place. The application of approximately 1,000 c.ft. of insulation took only two days. (This cold store has been in operation for over a year and no difficulties with icing up have been reported.)

" The carbon dioxide plant consisted of various vessels and pipework and the previous lagging (cork) had deteriorated progressively due to growth of ice and mechanical damage. The technique used was the *in situ* foaming process and preformed light-gauge steel sheets, which could be assembled rapidly, formed moulds with the existing surfaces of the vessels and pipework. The steel sheets were left in position after the foam was inserted in order to provide impact resistant cladding. Straight sections presented no difficulty and were positioned round pre-cast foam rings 1 in. thick which held the sheets in position and contained the foam when it was still in a fluid condition.

" The installation at Hillhouse has operated satisfactorily in service and the following conclusions are relevant. After 12 months' continuous service in this plant it was reported to us that ' there has been no deterioration or traces of frost . . . It is noteworthy that with recent installations employing cork lagging, frost has shown through at a number of points after two or three months' operation and corrective action has had to be taken.'

" Another trial carried out in November, 1957, has provided practical experience of the high-temperature performance of rigid foams which were used to insulate a 100-gal. steam-jacketed chemical reaction vessel. The lagging normally used on this vessel had been 85 per cent. magnesia but once the hard skin on the magnesia had been broken this lagging rapidly deteriorated. Also frequent plant modifications necessitated breaking of the lagging around flanges and patching was difficult with magnesia.

" The liquid foam mix was poured into sectional mouldings of wood and tinplate arranged around the pan jacket. Twenty-four hours later the moulding was removed leaving a 1½-in. thickness of foam adhering to the pan jacket. The foam thus prepared had a water-resistant skin and no other coating was applied. Since November, 1957, the pan has been in intermittent use with 80 p.s.i. steam in the jacket, corresponding to a temperature of approximately 160° C. During the frequent charging of the pan, spillage of chemicals, chiefly solvents, has sometimes occurred over the foam surface. Visual inspection of the foam shows it to be little discoloured and mechanically sound after two years of use. Neither the outer surface nor the adherence to the jacket has deteriorated.

" More recently in March, 1959, a silicate evaporator, consisting of a truncated steel cone approximately 20 ft. high, 13 ft. diameter at the base and 6 ft. diameter at the top, was insulated with sprayed rigid foam. The evaporator is exposed to the atmosphere and runs at an internal temperature of 70° C. Previously magnesia was used to insulate the vessel and the insulation was normally renewed at two-yearly intervals. Three inches of magnesia had been held in place with wire netting and covered with bitumin for weather protection. It was decided to apply 1½ in. of rigid foam in view of the lower K value of the sprayed foam (0·26 B.t.u. against 0·43 B.t.u. for magnesia at 50° C.) and because of the increased efficiency of installation.

" This was the first large-scale spraying work carried out with the I.C.I. spray equipment and the evaporator was working during the insulation process. The surface finish obtained in places was uneven due chiefly to the flanges and bolts in the structure. This led to an improved technique where a band of brown paper is taped over flanges so that a relatively smooth contour to be sprayed is presented. This technique has been used successfully in more recent large-scale spraying of chemical plant.

" The insulation of the evaporator was completed in four days, in spite of interruptions since the work also served to demonstrate the process, whereas three weeks was normally required when insulating with magnesia. This saving in labour not only offset the higher raw material costs of rigid foam but on labour and raw material costs a 40 per cent. saving was achieved. The saving in time of installation also ensured that the plant was working at full efficiency after four days and this represents a real additional saving. Evidence on the performance of urethane foams is also becoming available from other field trials. One of the most interesting was reported by Laing to the International Institute of Refrigeration at Copenhagen. He described tests which were carried out to determine the heat leakage through the insulation of the domestic chambers of two sister ships, identical in arrangement and external surface, differing only in the type and thickness of the insulation. In one ship the vertical surfaces and deckhead were insulated with loose glass wool and the deck was insulated with slab cork. The chambers on the second ship were insulated with polyurethane rigid foam, a reduced thickness of insulation being used.

" Lloyds Register of Shipping assisted in the test procedure of the two ships and it was found that the polyurethane foam insulation approached more closely the theoretical efficiency than the glass wool-cork combination."

NOW!

Down goes the price of the famous Prestcold Farmoor

Now the finest, most efficient way of making a profit from frozen food costs less! Prestcold reduce the price of the Prestcold Farmoor. The saving varies according to the model you choose, but a standard model now costs only £355.

Write for details of the Prestcold Farmoor today. This profitable investment is even more profitable now!

FOR FRESH IDEAS... IT'S

Prestcold

To: Commercial Sales Department, Prestcold Division, Pressed Steel Company Limited, Cowley, Oxford

Please send me full details of the Prestcold Farmoor and Farmoor-de-Luxe.

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ADDRESS .....

.....

MR1

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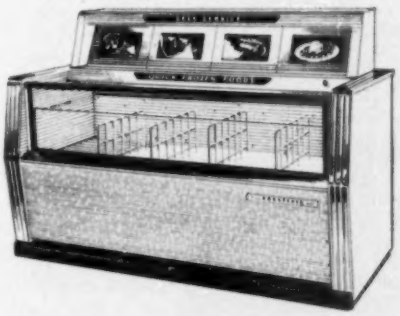
Up come Prestcold with the new Farmoor-de-Luxe

Here's another fresh idea from Prestcold to help you sell even more frozen food. The new Prestcold Farmoor-de-Luxe is the most eye-catching, customer-stopping frozen-food case ever designed!

Eye-catcher number one: an all-over stainless steel trim. Eye-catcher number two: an attractive front display panel which comes in blue, grey or red, as you choose. Send the coupon now, and find out how easy it is to own this splendid new profit-maker.



The Prestcold Farmoor-de-Luxe actually takes over 700 packets of frozen food

COMMERCIAL AND INDUSTRIAL SECTION

Manufacturers' and Distributors' News

With the tremendously rapid increase in scope and complexity of modern heating, ventilating and process control installations, the necessity for the control scheme to fulfil adequately the functions of control in all respects is of vital importance. For the control engineer to design a system he must, however, be completely aware of plant performance and characteristic fundamentals. **Thermocontrol Inst. Co. Ltd.**, have recently held a five-day lecture series at the National College of Heating, Ventilating, Refrigeration and Fan Engineering. The scope of the course was designed to emphasize modern plant techniques associated with the correct method of overall control. The plant lecturers included Dr. Scott, head of the college, Mr. Lawrence, Mr. Sedgley, and Mr. Fischer, backed by lecturers on control techniques from specialist engineers of Thermocontrol's own organization. The lecture series was attended by over 50 members of the staff covering technical sales engineers, contracts engineers, service engineers, and senior executive staff. The unusual success of the lecture series will, it is felt, provide the basis for a National College course on automatic control techniques. The present series covering Thermocontrol engineers has, however, helped to ensure the maintenance of the highest technical standards being made available for future installations.

* * *

A new tube bending machine that will have a wide application in the refrigeration industry has been developed by **Hilmor Ltd.** This entirely new automatic mandrel bender incorporates several new features. The aim has been to produce a reasonably priced machine which is thoroughly reliable, which is simple to operate and easy to maintain. With this in view mechanical drive has been chosen as the prime mover and all unnecessary elaboration has been avoided. The machine will produce on a repetition basis completely round, full bore bends, cold and unfilled on standard or on extra short radii, and the output, which depends entirely on the type of bend to be produced, is up to 700 bends per hour. The maximum capacity of the machine is 1½-in bore by 16 g. non-ferrous tube (u.t.s. 32,000 lb. p.s.i.) and 1¼-in. o.d. by 14 g. steel tube (u.t.s. 60,000 lb. p.s.i.) and it is particularly suitable for the production of short radius return bends used in the manufacture of refrigeration coils. Control is by foot-operated or pedestal switch and a 12-station degree of bend selector, either automatic or manually controlled, is fitted. The machine is capable of right- and left-hand bending and the changeover is effected easily and quickly. Hilmor Ltd.'s address is Caxton Way, Stevenage, Herts.

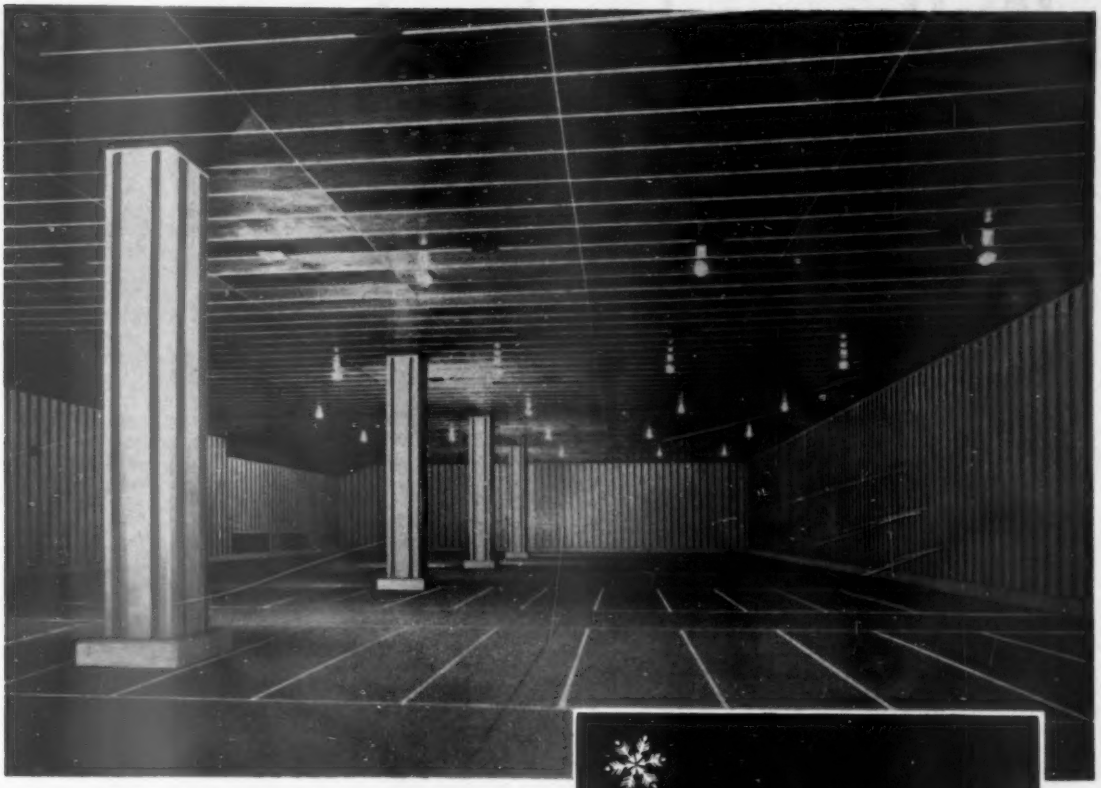
* * *

Bakelite Ltd. announce the introduction of "Vybak" DVR.262, a thermoplastic rigid sheet material which has been developed to meet the need for a p.v.c. sheet combining toughness with good vacuum-forming properties. The material represents a new approach to the formulation of high impact strength p.v.c. sheet, in that it is produced entirely from p.v.c. copolymers. It contains small quantities of stabilisers, lubricant and pigment but no plasticisers, and the use of modifiers, which often lead to poor ageing characteristics, is therefore avoided. The new material has good dimensional stability and is capable of deep draw with good detail. Its unique toughness and deep drawing characteristics make it useful for many applications such as refrigerator liners, trays, industrial containers and other formed shapes. Copies of Advance Information Sheet K.16, which covers such details as physical properties, machining, forming and cleaning, are available, free of charge, from Bakelite Ltd., 12-18, Grosvenor Gardens, London, S.W.1.

* * *

To meet the demand of hotels, bars, and restaurants for a machine to make clear ice cubes in good quantities the **Frigidaire Division of General Motors Ltd.**, has announced its Automatic Ice Cube Maker, Model CMZ–11, now available. An illustration of the model appeared in the February issue of MODERN REFRIGERATION. The machine produces a constant supply of cubes ⅞-in. sq. and of a thickness between ¼-in. and 1-in., as desired by the operator. No attention is needed beyond scooping the cubes from their refrigerated store chest when required. Compactly designed so that it can be easily installed behind a bar, under the counter, or stand freely in any position, the CMZ–11 is connected to the main water and electricity supplies, provided with a drain outlet, and from that moment works entirely automatically. Water is circulated by a motor-driven pump and flows down an inclined evaporator plate to fall into a return water trough from which it flows back to the reservoir. As it flows, a surface of ice builds up on the evaporator. When the ice sheet reaches the required thickness, refrigeration ceases and a valve diverts hot refrigerant discharge gas to the evaporator. The ice sheet is freed and slides off the evaporator plate on to a row of heater wires which cut the ice into strips. These strips then fall on to transverse heater wires and are cut into cubes. The cubes finally fall into the ice storage bin and the entire operation continues until switched off automatically when the bin itself becomes full. The CMZ–11 will produce approximately 5,000 cubes every 24 hours. Powered by a Frigidaire sealed "Meter Miser" rotary compressor, the CMZ–11 also has a water circulating pump motor. The cabinet is 30-in. wide, 29¾-in. deep

New Cold Store for STAMINA FOODS LTD., St. Helens



INSULATION by "J.D."

In specifying "J.D.", Stamina Foods Ltd. ensured that the insulation of their new cold store was to be carried out by a company whose wide experience and knowledge are a byword in the industry, extending over commercial, industrial and marine fields.
"J.D." have contracts for some of the most modern installations embodying all the latest technical improvements both in materials and methods of construction. Our technical advisory service is available at all times and estimates are given for either the traditional type of cold store or, if required, the modern method of envelope construction.

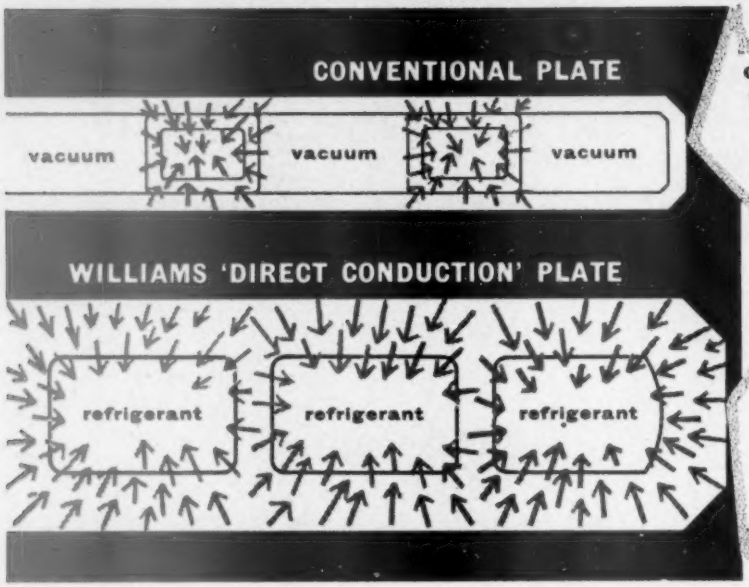
"J.D." Insulating Company Limited were entrusted with the insulation of this impressive new cold store by L. Sterne and Company Limited, the Architects being Messrs. Gornall, Kelly and Partners of Liverpool. An important factor in securing this order was speed of erection—just six weeks site time. The capacity of the cold store and cooler compartment is 150,000 cubic feet and the cold store will be maintained at a temperature of zero to minus 5° F.
An interesting feature is the false ceiling extending over the whole area and forming an air duct with air diffusers set in same. Specially manufactured metal air ducting was fitted connecting the false ceiling to the three air coolers.

"J.D." Insulating Co. Ltd.

Head Office : Hawthorne Road, Bootle, Liverpool, 20 *Tel. : Bootle 2205 (5 lines)*
Branches at :—London, Glasgow, Newcastle and Southampton

This is what produces higher quality—with

Williams Faster Freezers



Conventional plate fabricated, with up to 2½" of non-conductive vacuum between refrigerant channels

Williams 'Direct Conduction' Plate A one-piece extrusion—far bigger refrigerant channels with direct through-metal conduction all round. Patent No. 37192/58

Here's Why

The beneficial effects of rapid freezing have been well-known for a long time. Smaller crystal size means less damage to fibres, with reduced losses in flavour and nutrient value. With the development of the Williams 'Direct Conduction' double contact alloy plate, faster freezing has been made possible with its attendant advantages of higher quality and greater production capacity.

Here's How

Unlike conventional fabricated plates, whose efficiency is limited by the wide pitching of refrigerant tubes and the vacuum space between them—the Williams 'Direct Conduction' plate is a one-piece alloy extrusion. It is totally filled with refrigerant passages—close together—with direct through-metal conduction on all sides. Result—significantly faster freezing.

Here are some of the figures

PRODUCT	TYPE OF PACK	TEMPERATURE	USED TO TAKE (mins)	NOW TAKES (mins)
Fish	Tray 2" thick	+54°/-5°F	120	42½
Peas	Carton 1⅛" „	+57°/-5°F	120	40
Meat	Paper Wrappers 7/12" thick	+38°/-5°F	65	12

WILLIAMS of LONDON

in association with GRASSO of Holland

Refrigeration engineers. Individual machines or complete installations to customers' requirements.

G. WILLIAMS ENGINEERING CO. LTD, DISRAELI ROAD, WILLESDEN, NW10. TELEPHONE: ELGAR 4225-6-7

over hardware and 38⅛-in. high. Weight is 237 lb. The external appearance is smooth, in a combination of coppertone and light beige finish of stoved enamel.

* * *

Gaggia (London) Ltd., announce that they have acquired the sole selling rights in the United Kingdom of the products of the Sweden Freezer Manufacturing Co., of Seattle, Washington, U.S.A. The widest-selling product of the American Company and the one which is expected to have the greatest impact in this country is the Sweden Soft Server which manufactures and vends the increasingly popular American style "soft" ice cream. This machine can dispense about 8 gallons of ice cream an hour. A liquid mix is fed continuously from a storage tank into the freezing cylinder below and it is automatically refrigerated and prepared for vending at a temperature of 22° F. Two models of the soft server are available: the "popular" is 14¾ in. wide, 20 in. deep and 52⅛ in. high; and the counter model, which is self-contained, is 14¾ in. wide, 26 in. deep and 26½ in. high.

* * *

We learn that, as from December 1, 1959, Mr. G. E. Jennings has been appointed general manager of **Minikay Limited.** Since the formation of the company, Mr. Jennings has been responsible, as sales manager, for introducing the Minikay system into the United Kingdom. In 1956 he was responsible for introducing the now well-known Miniveil air curtain unit for use on open cold store doors. Mr. Jennings is an associate of The Institute of Refrigeration.

* * *

The *Jamaica Planter*, the first post-war ship to be built in Scotland for the Jamaica Banana Producers Steamship Co. Ltd., has completed her trials. She is the fourth ship to be built for these owners by Lithgows Ltd. and has been specially designed for service between the West Indies and the United Kingdom. She will carry approximately 1,900 tons of bananas in her main holds. Refrigeration installation was by **J. & E. Hall, Ltd.**

* * *

A new piston type pressure switch which has been designed specifically to deal with hydraulic installations where high rates of operation and sudden applications of pressure are encountered, is being produced by **K.D.G. Instruments Ltd.,** Manor Royal, Crawley, Sussex. The pressure element comprises a stainless steel housing and piston fitted with an "O" ring seal operating against a spring. Using an "O" ring seal does away with the necessity to have an oil bleed return which is required on other types of piston switches. Two models are available 0—2000 and 0—5000 p.s.i. To increase life with the minimum amount of servicing or repair the unit is fitted with an easy changeable device for replacing the "O" ring should this at any time show signs of wear, and a spare ring is also supplied with every instrument together with full details for the changing of same. Models are also available with pressure setting dials.

* * *

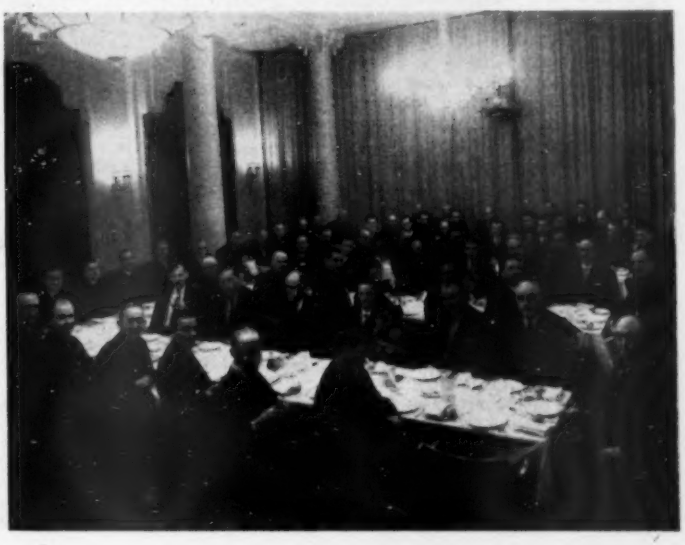
The second **Hussmann** distributors' conference was held recently at the Waldorf Hotel, London. Thirty distributor firms were represented, covering Great Britain and Ireland. The conference extended over a period of two days, during which the customary addresses and interchange of views took place and the new Hussmann four-deck Cascade was introduced and acclaimed. The Hussmann distributor shield, to be awarded annually to the distributor to achieve the highest percentage over quota was presented for the first time, the winners for 1959 being Mansfield Ice & Cold Storage Co. Ltd., of Mansfield, Notts.

* * *

The various forms of "Rocksil" rock wool insulation material made by **The Cape Asbestos Co. Ltd.,** were shown on the company's stand at the Industrial and Commercial Refrigeration Exhibition to be held in the Old Horticultural Hall, London, on February 15, 16 and 17. A display showing the use of "Rocksil" Loose Wool and resin bonded slabs for the insulation of refrigerated ships' holds was built by Andersons Insulation Co. Ltd., of Liverpool, a subsidiary of Cape Asbestos, who also exhibited one of their well-known steel stove-enamelled insulated doors for ships' cold stores.

* * *

Accurate control and measurement of temperatures ranging from —200° C. to 2,000° C. is obtained with a new potentiometer recording controller—the "Xactrol" series 2,000—recently announced by **Ether Limited,** Tyburn Road, Birmingham, 24. This device, which is also suitable for measuring variables such as speed, strain, pressure and hydrogen-ion concentration, as well as any other quantity that can be expressed in an electrical signal, incorporates a zero-differential control system. This consists of sliding-contacts on a variable-positioning pick-up track which is connected in series with the control relay, and, because this obviates the necessity



Delegates at the Hussmann Distributors' Conference Dinner.

of mechanical force for operation of the control, a higher safety factor is achieved.

* * *

New Merseyside and North Wales territory area manager of the domestic appliance division of the **English Electric Co. Ltd.**, is Mr. Robert Attwooll, of Upton, Wirral, Cheshire. A Scot from Peterhead, Mr. Attwooll joined the company as a sales representative in 1952 and covered the area which he now controls. He will continue to be based at Liverpool. Mr. Attwooll, a member of the Electrical Trades Golf Society, is married and has one daughter. He served with the Royal Engineers during the 1939–45 war.

* * *

A new booklet "Polyzote for Road Transport Insulation" has been issued by **Expanded Plastics Ltd.**, Croydon, a subsidiary of the Expanded Rubber Co. Ltd. Polyzote expanded polystyrene, the booklet explains, is particularly suitable for use in conjunction with insulated road transport, because of its density of 1 lb per c.ft. Its high thermal efficiency allows a reduction in the thickness of insulation required and this is often able to effect a decrease in the size and weight of a structure with a subsequent increase in its original carrying and storage capacity. The material has a K value of 0·24 B.t.u.

* * *

The newly appointed export sales office manager of **The English Electric Company's** Domestic Appliance Division is Mr. William A. Weaver, who will be responsible to Sales Manager, Mr. A. Mackenzie Parkinson. Swansea-born Mr. Weaver, who comes to English Electric with considerable experience in the engineering and consumer goods export markets, speaks French, Italian, German, Spanish and Russian. During the 1939–45 war he served as a Flight-Lieutenant in the R.A.F. and escaped five times during a two-year spell as a prisoner-of-war in Italy. Mr. Weaver succeeds Mr. C. F. Bircher, who is now concentrating on the merchandising programme of the Company's home laundry equipment.

* * *

Expansion of the activities of the division has led to the reorganisation of territorial representation. Mr. John E. Pearson, 26 years with the company and formerly North West area manager, becomes northern territory manager responsible for the four northern area boards. Mr. J. Barber, former south west area manager, has relinquished his Bristol post for personal reasons and moves to Torquay, where he will continue to represent the company in the Devon and Cornwall sub-areas of the South Western Electricity Board. Four new area managers have been appointed. Mr. R. W. Alexander becomes area manager of the north east territory, Mr. Clifford Mathews takes over the Bristol area, Mr. Robert Attwooll the Merseyside and North Wales territory, and Mr. Charles Axe the Manchester area. Mr. Alexander, who joined English Electric as a sales representative in 1954, will continue to be based in Newcastle. He is hon. secretary of the N.E. Electrical Club. Bristol-born Mr. Mathews, promoted from area representative to manager, also joined English Electric in 1954. Mr. Attwooll, a Scot from Peterhead, has been a sales representative in the area he now manages since joining the Company in 1952. Mr. Axe moves from Sheffield, where he has been a sales representative since 1949, to Manchester. He has a son at Manchester University. Mr. Arthur H. W. Bradstreet remains assistant sales manager based in London.

* * *

The Westinghouse Electric Corporation in America has produced a bottle cooler-warmer using the electronic refrigeration principle. One version of this new product uses a car cigarette lighter outlet as a source for electric current, and the other is designed for use in the bedroom or nursery. The principle of electronic refrigeration has been known since its theoretical discovery by Peltier in 1834, but recent Westinghouse developments have made it possible to take it out of the laboratory into the realms of practicality. Another likely application for the system which is being considered by Westinghouse is a hostess cart which is a combination refrigerator and oven.

* * *

Union Carbide Ltd., announces the appointment of Mr. H. Cawley to the position of Sheffield area sales manager, with his office located at Grange Mill Lane, Wincobank, Sheffield.

* * *

A versatile finishing wrap for lagging installations has been developed by the **Turner Brothers Asbestos Co. Ltd.**, Rochdale. Known as Firefly Aluminised Asbestos Cloth, this material provides all the advantages of a fire-proof cover cloth, whilst comparing favourably in appearance with the best plastic and

Among the many safety devices used to protect the men who work at 50 degrees F. below freezing in the new cold store recently completed on the site of the vast new Gloucester factory being built for T. Wall & Sons (Ice Cream) Ltd., is a series of alarm switches. All the doors can be opened from the inside and all are fitted with heating elements to keep them from freezing shut, but on the off-chance that all exits' locks should jam or their heating elements stop working, anyone who finds himself locked in can throw one of these switches. An alarm is sounded which will send men running to let him out.

Business grows. Add a new machine. And grows and grows. Add a couple more. Sounds simple—till you start wondering where the money's coming from. That's where UDT comes in. UDT helps you replace old equipment, add new, out of income. Which often means it pays for itself out of increased profits. A nice businesslike way to do business. If you think UDT could help you, get in touch with the Manager of your nearest UDT office—the address is in your local directory.

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Eastcheap, London EC3

INDUCED DRAUGHT
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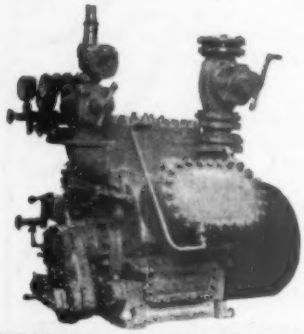

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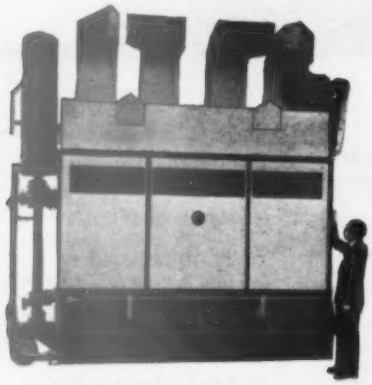

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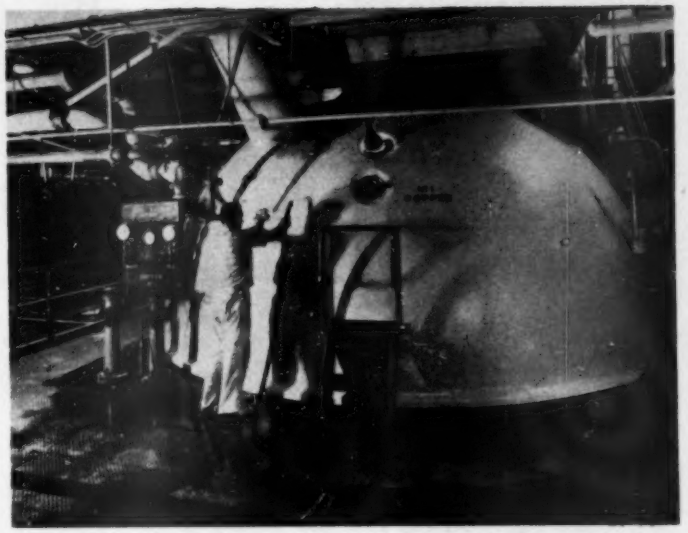


The insulation of this process vessel has been protected from mechanical, vapour and chemical attack by a coating of TEXOLAG insulation protective, made by R. A. Brand and Co. Ltd.

decorative cleading finishes. It is, the makers claim, strong and impermeable to moisture, and it achieves thermal economy by heat reflection. It is easily fitted, can be applied over primary pipe insulation, and can be fabricated into mattresses and applied for heat protection to personnel. The new material is described in a leaflet recently issued by the company.

* * *

Glasgow Corporation Planning Committee has refused an application by Mr. John Shepherd of 4 Forres Avenue, Gifnock, for creation of an ice cream store in Glasgow. Mr. Shepherd sought permission to use garage premises at Gavinton Street, Glasgow S.4, converting them for use as a refrigerated ice cream store.

* * *

Kelvinator Ltd., of Argyle St., Glasgow are co-operating with the Scottish Central buying group of independent grocers to provide refrigerated equipment for their premises. The group is organized in Scotland by John and James Tod & Sons Ltd., of Leith, and has 140 independant grocer members who buy through the organization. Kelvinator staged a display of refrigerated equipment in the self-service shop which was a feature of the first Central day in Scotland held at the beginning of December.

* * *

Mr. L. Goodger, Sales Manager of H.R.P. Ltd. (right) discusses a blown-up model of the Teddington THINLINE Thermostat with Mr. V. J. Lewis in London last month. Mr. Lewis is in charge of Teddington Home Contract Sales.

Moray Firth Foods Ltd., of Bunchrew, Inverness, have been carrying out experiments in the freezing of flowers and have perfected their techniques to allow out of season delivery. Mr. A. G. Thornton, managing director of the firm has carried out the work on roses and heather and is receiving queries from the U.S.A. as to the methods employed. Vacuum packs have been developed for transportation and the firm is now working on reduction of bulk. The firm market venison in Germany and also freeze raspberries, strawberries, scampi, lobster tails, rabbits, game and turkey for the home and export markets.

* * *

One of Harrogate's best-known hotels before the war, the 200-year old "Crown" was recently derequisitioned having been occupied by the Royal Air Force since the outbreak of the last war. It has now been completely restored to its former elegance and a new range of equipment has been installed. The **Prestcold** Division of the Pressed Steel Co. Ltd. has handled the supply and installation of refrigeration plant in the hotel and facilities have been provided for chilling beer and soft drinks and storing foodstuffs. Appliances include two 6-ft. bottle-cooling shelves, a 4 ft. 6 in. special display case for the restaurant, a wet-fish cabinet, and a 4 c.ft. domestic refrigerator for the still room. In addition Prestcold engineers have overhauled and put into operation a 500 c.ft. cold room and wine-dispenser cabinet.

Mr. C. F. P. Bevington.

R.S.A. NEWS

HALOGENATED REFRIGERANTS

"Halogenated Refrigerants" was the title of the lecture presented by Mr. C. F. P. Bevington of Imperial Smelting Corporation Ltd. that attracted a full meeting on January 27.

Under the more familiar trade names of "Isceon," "Arcton" and "Freon," these refrigerants have, in their short history, ousted SO_2 and CH_3Cl, and, in the small commercial group, NH_3. The popularity of these refrigerants is shown by their increasing use in the larger plants and in refrigeration in general that has caused production to be stepped up considerably both here and in America. It was quoted that recently in America one year's production of halogenated refrigerants was 130,000 tons.

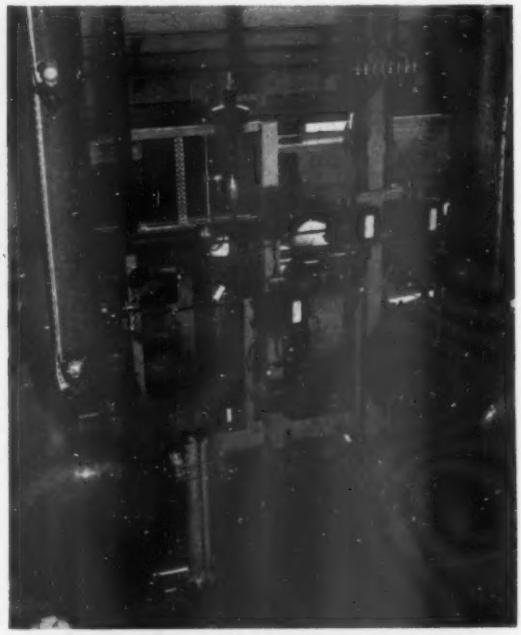
Up to 30 years ago refrigerants used in the domestic field did not possess the desirable properties of an ideal refrigerant. To mention only two, CH_3Cl and SO_2, the flammability of one and the toxic nature of the other are well known and in the commercial field, the excessive working pressures of CO_2 and toxic quality of NH_3 prevented them being regarded as desirable refrigerants.

About this time two American chemists during their research for a refrigerant with the desired qualities, discovered in the field of halogens the type of refrigerant containing these qualities. Mr. Bevington demonstrated how two elements from this field, flourine and chlorine, in various combinations with carbon and hydrogen make up the different halogen refrigerants. Flourine giving the desired stability, these refrigerants are non-inflammable, non-toxic, non-corrosive, and do not adversely affect metal or oil. A slide comparing the physical properties of various refrigerants proved the halogen group contained most of the required properties.

Slides showed various stages of manufacture—fractional distillation plant, intermediate and final product tanks, control room, packaging panel with weighing machine. Manufacturing methods were described telling of the care taken to ensure a pure article is dispensed for use. The importance of purity was stressed with a description of quality control and analysis. Various methods are used to ensure the constituents are in their correct order and quantity; one of these being the gas chromatogram method. As is to be expected water content is of an extremely low order.

The numbering of flourine refrigerants is carried out by using the chemical formula as a base. The method is as follows :—the number of carbon atoms minus 1 (if 0 results, omit this number), the number of hydrogen atoms plus 1, the number of flourine atoms. The following two examples are given :—CCl_2F_2 = 12, $CClHF_2$ = 22.

It was of interest that a by-product from the original experiments is used in the propellant field. An early use was with an insecticide for tropical use with the forces. It will be recalled this was a container operated by a press button that effectively sprayed insecticide. To-day aerosol dispensers are used to spray hair lotions and lacquers, shaving creams, sun-tan lotion, powders and lubricants to name a few of the contents. It was pointed out that this extensive usage of propellants has



Imperial Smelting Corporation Ltd. Isceon Plant: part of the automatic fractional distillation section.

caused the birth of a new industry that is growing by leaps and bounds.

Among the questions asked was the possibility of including a smelling agent in an automatic plant to warn of a leak. It appears that such an agent might not react favourably with the refrigerant. The miscibility of oil in "F-22" for low temperature work was brought up. It will be recalled that

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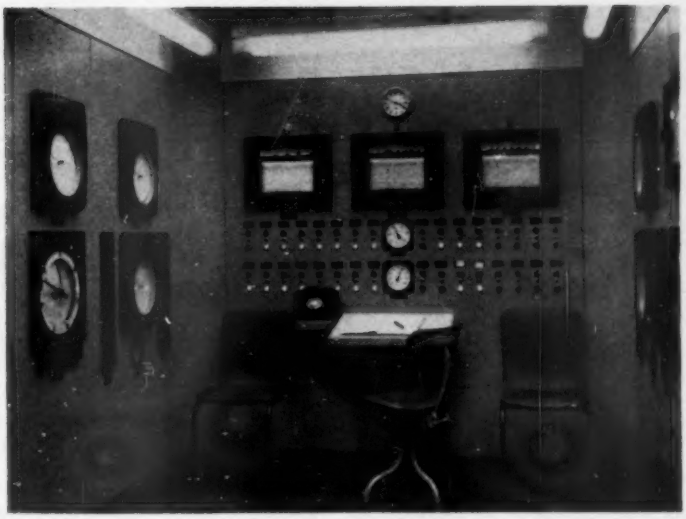

Imperial Smelting Corporation Limited, Avonmouth. Isceon Plant: Control Room.

this question arose at a previous meeting where the addition of a percentage of " F-12 " was suggested to assist the return of the oil. Filling ratios of cylinders were explained in answer to a question of over-filling cylinders and the consequent dangers. World acceptance of this method and familiarity with " Freon," the first halogen refrigerant produced, answered the question why the A.S.R.E. method of numbering refrigerants is used.

After other interesting questions were answered, as is usual on these occasions, time determined the closing of the meeting. Grateful thanks were given to the speaker who had travelled that day from Avonmouth for this lecture and was due to return that night. The hon. sec. continued with his after-meeting task of accepting more enrolments in addition to those received by post.

An invitation is extended to non-members to attend our meetings. On a visit from Denmark, Mr. Moller-Olsen spoke on " Automatic controls " on February 24, and " Commercial refrigeration " will be the subject for the lecture on March 30. These meetings will be held at 7.30 p.m. at 71, Queensway, London, W.2. The nearest station is Bayswater. Tea and biscuits are obtainable for those arriving in time.

RELATIVE HUMIDITY AT ROOM TEMPERATURE

A SIMPLE apparatus for producing sudden changes in relative humidity at room temperatures, has been designed and constructed by the U.S. National Bureau of Standards. The equipment was developed by S. Hasegawa, S. B. Garfinkel, and A. Wexler of the Bureau's Humidity Measurements Laboratory of the mechanical instruments section.

The apparatus consists basically of two closed and independent humidity systems, either of which may be connected to a test chamber. By means of solenoid-controlled valves, the chamber can be switched rapidly from one humidity system to the other. Air in each system is kept moving by an oil-free impeller-type pump.

The value of the relative humidity in each system is controlled by a saturated salt solution. Held in a cylindrical glass chamber, 8 in. in diameter and 8 in. high, the solution is made up with distilled water and chemically pure salt. It is well known that when a container is sealed and air is circulated within it to obtain equilibrium conditions, the space above the solution assumes a constant relative humidity. The precise value of this humidity depends on the salt used and also, in general, on the temperature. For the purposes of the present apparatus, however, it is possible to choose salts that produce the required relative humidity and which have a small or negligible temperature coefficient at room temperature.

In each humidity system, the air is driven by a pump first through a heat exchanger, which brings the air within the system to room temperature, and then conducted to the salt solution chamber where, by an arrangement of nozzles and baffles, it is brought in intimate contact with the solution. From the salt solution chamber, the air may take one or both of two paths. It may flow through a by-pass, and return directly to the pump, or, when the proper valves are open, it may pass through the test chamber before returning to the pump. When the valves are set so that the system is connected to the test chamber, another valve in the by-pass may be adjusted until a flowmeter indicates the desired flow rate through the test chamber.

During the time that one of the systems is connected to the test chamber, the air in the other continues to be circulated by its pump. Then, when the electrically controlled valves switch the chamber from one system to the other, the old air is quickly replaced by new. Because of residual air in the chamber and dead spaces in the plumbing, however, it is estimated that from 0·03 to 0·05 sec. is needed to establish the new relative humidity.

To provide for different air speed requirements and for the different sizes of hygrometers tested, several interchangeable test chambers are used. In one of these, air speeds up to 570 ft. per minute have been attained. The flowmeter for measuring air speed is of the glass wool linear type.

Production of Carbon Dioxide and Dry Ice

Carbon dioxide can be obtained from a number of sources but most of these, as the present article explains, require the use of complicated extraction and purification systems which make them unsuitable for the supply of the gas under modern industrial conditions. Two methods are increasing in popularity ; the production of carbon dioxide from coke by the absorption from the combustion gases by means of potash lye ; and absorption by means of an alkacide. The two methods are compared from the points of view of efficiency, purity of the end product and economy. Other factors taken into consideration are the liquefaction of CO_2 containing foreign gases, storage and bottling, and the production of dry ice. This article has been adapted from one which appeared in a recent issue of Escher Wyss News, to whose editor we are indebted.

by K. Nurmberger and H. Kubli

CARBON DIOXIDE can be obtained either from natural springs, as a result of fermentation in breweries and alcohol works, as a by-product of the chemical industry, from combustion gases, limestone kilns, etc. Production of carbon dioxide from carbonates such as limestone or dolomite by means of a reaction with acid has long been superseded as far as industrial purposes are concerned.

The simplest method is to obtain carbon dioxide from natural springs which produce pure CO_2-gas. Such a plant was erected by Escher Wyss Ltd., of Zurich, in the highlands of Columbia recently in connection with a dry-ice plant operating on the Carba system, with an output of 240 kg. of dry ice per hour.

Most springs, however, do not produce pure CO_2 but a product which includes foreign gases which have to be removed either by means of de-aeration, by means of a chemical process, by absorption or a combination of these, depending on the nature of the gases. A plant in which CO_2 is obtained from a spring which contains H_2S, exists in Pompey where Escher Wyss have supplied a dry-ice plant with a capacity of 5 tons per day.

The production of carbon dioxide and dry ice from natural springs is only economical if there is a sufficient local market. Transportation of carbon dioxide over long distances is very costly. From most springs, gas is obtained at a low pressure and the energy required for liquefaction must be provided in addition. If carbon dioxide is obtained from the fermentation tanks of a beer brewery, the gas must not only be dried and de-oderized, which can easily be effected by means of well-known drying agents and activated carbon, but it also requires removal of hydrogen bisulphide which is present in very small quantities only. Fig. 1 shows the general layout of such a plant.

For condensing the carbon dioxide in this case, a low-pressure condenser, cooled by means of a refrigeration plant, is provided. The condenser is equipped with automatic de-aerating means. The fluid carbon dioxide flows from the condenser straight into the insulated tanks underneath, in which it is stored at a temperature of approximately $-25°$ to $-30°$ C. When the carbon dioxide plant is shut down and the pressure in the tanks rises on account of heat influx, the refrigeration plant is automatically switched on until the desired pressure is restored. Such plants normally cover the domestic consumption of the breweries only.

If carbon dioxide is obtained from the combustion gases of coke or high-carbon oils, steam power can be generated and used for driving the compressors of the liquefaction plant. Such plants are, of course, built in the centre of the consumer area so as to reduce the distributing costs to a minimum.

Other fuels such as coal, anthracite and wood do not lend themselves readily to the production of CO_2. Combustion gases from coal and anthracite contain impurities which can only be removed with the aid of special equipment which is costly in initial expenditure and upkeep. This makes the whole plant uneconomical.

Methane and oils which are poor

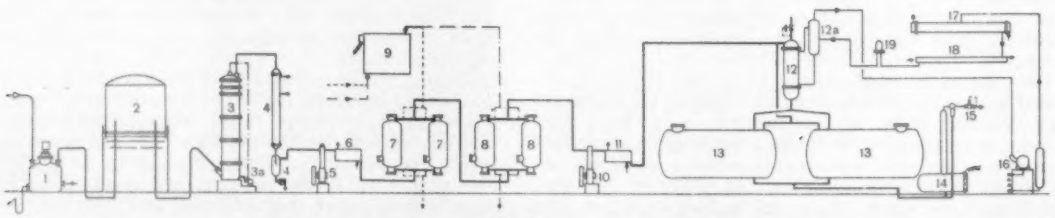

Fig. 1.

General layout of a plant for the production of carbon dioxide from the fermentation tanks of a beer brewery. The gas requires drying and de-oderizing and it is also necessary to remove a very small quantity of hydrogen sulphide. 1—Washer and foam separator; 2—Gas tank; 3—H_2S purifier; 3a—pump for $CuSO_4$ solution; 4—NH_3 cooler for water removal; 5—Compressor 1st stage 1-4(5) atm.abs.; 6—Gas cooler; 7—Silicagel drier; 8—Activated carbon filter; 9—Heater for regenerator air or steam; 10—Compressor 2nd stage 4-18 atm.abs.; 11—Gas cooler; 12—CO_2-condenser-NH_3-evaporator; 12a—NH_3-separator; 13—CO_2-L.P.-tank; 14—CO_2-evaporator and superheater; 15—CO_2-throttle valve; 16—NH_3-compressor "Rotasco"; 17—NH_3-condenser; 18—NH_3-undercooler; 19—NH_3-float control valve.

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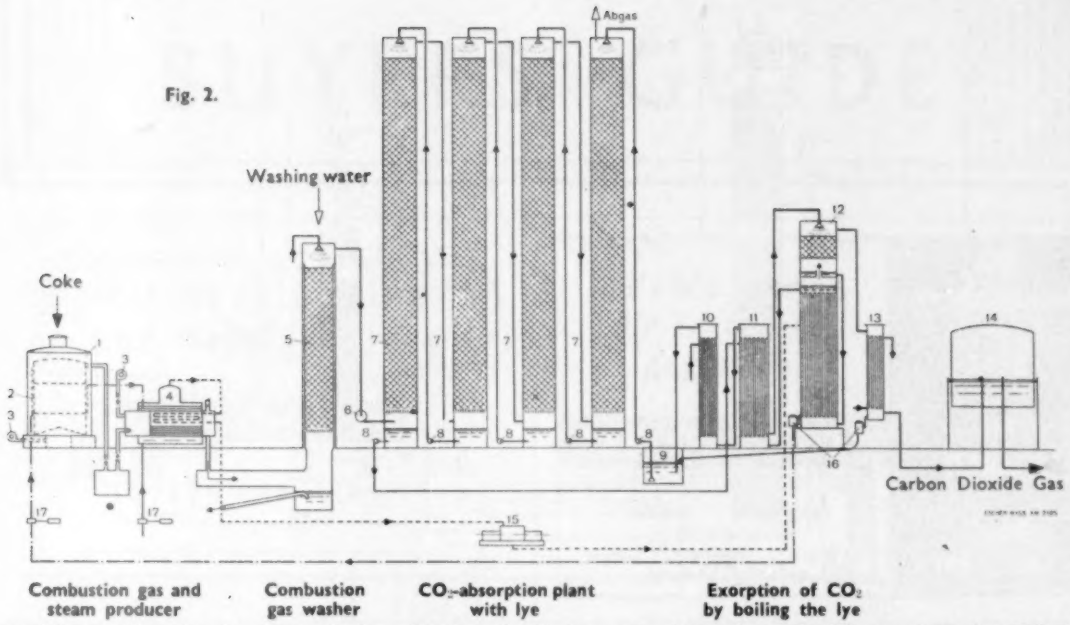
Fig. 2.



General layout of a plant for the production of carbon dioxide from coke. Absorption of the CO_2-gases from the combustion gases with potash lye. The plant is equipped with a gas generator in order to be able to operate with a small excess of air. CO_2-content of the combustion gases about 19 per cent. 1—Gas generator; 2—Cooling mantle; 3—Air blower; 4—Steam raiser; 5—Washing Tower; 6—Blower for combustion gases; 7—Absorption tower; 8—Lye pump; 9—Lye tank; 10—Lye cooler; 11—Heat exchanger; 12—Lye boiler; 13—CO_2-gas cooler; 14—Gas holder; 15—Steam turbine; 16—Steam traps; 17—Feed pumps.

in carbon produce a gas which contains relatively little CO_2 from which it is hardly worthwhile extracting the carbon dioxide. Wood was used during the war years as a substitute for coke in order to produce carbon dioxide. The plant, however, was unsatisfactory because the combustion gases soiled the lye and apparatus. Furthermore, odour-producing substances such as naphthaline had to be removed from the gases. Charcoal, however, is suitable for the production of carbon dioxide but is seldom available at an economical price.

Production of carbon dioxide from exhaust gases of lime kilns which are rich in carbon dioxide can be considered if the consumer area is near the lime kiln plant. This is seldom the case, so that few such plants are in existence.

By far the most popular method is to obtain carbon dioxide from coke by absorption of the CO_2-gases from the combustion gases by means of potash lye. Fig. 2 shows the general layout of such a plant which is equipped with a gas generator so as to keep the air excess at a minimum. The exhaust gases from the steam boiler contain about 19 per cent. CO_2. They are taken through a washer with water sprays and then, in counter current to the potash lye, through the absorption column. The potash (calcium carbonate) absorbs the CO_2 to form calcium bicarbonate. The lye, which is saturated with CO_2, is passed through a heat exchanger into the lye boilers where it is heated, as a result of which the bicarbonate releases CO_2 and returns to carbonate. The hot, de-aerated lye is taken through the heat exchanger and a cooler into the lye reservoir from where the cycle recommences.

The steam produced in the boilers drives a back-pressure steam turbine which supplies the energy for driving the compressors of the liquefaction plant and the lye pumps. The exhaust steam from the turbine is used for heating the lye boilers. Fig. 5 shows the absorption towers and the washing tower of such a plant in which 2 to 2·2 kg. of liquid carbon dioxide are obtained from one kilogramme of coke. This, however, is a peak performance for plants using potash lye. Most coke-potash plants yield 1 to 2 kg. of liquid carbon dioxide per kg. of coke. The disadvantage of this process lies in the fact that not all the carbon dioxide contained in the combustion gases is extracted by the potash lye. The gas leaving the last absorption tower still contains about 4 to 5 per cent. CO_2 besides nitrogen and some oxygen. Therefore, a search has been made for absorption media which completely extract the carbon dioxide. By adding chemicals such as ammonia (Makmar process), monoethanolamine, etc., to the potash lye, improvements were obtained. The economy of the plant, however, was not improved on account of the additional costs (de-odorization, recovery of the volatile additives, increased supervision) so that these methods have not proved popular.

The process employing pure monoethanolamine as an absorption medium extracts all the carbon dioxide from the combustion gases. The plants are smaller than the equivalent potash plants, but, according to the prospectuses, the consumption of monoethanolamine and other chemicals is far more costly than the production costs of carbon dioxide with the conventional coke-potash plant. The monoethanolamine process, therefore, is only suitable for small plants.

Several years ago the Escher Wyss associates, Carba, of Berne,

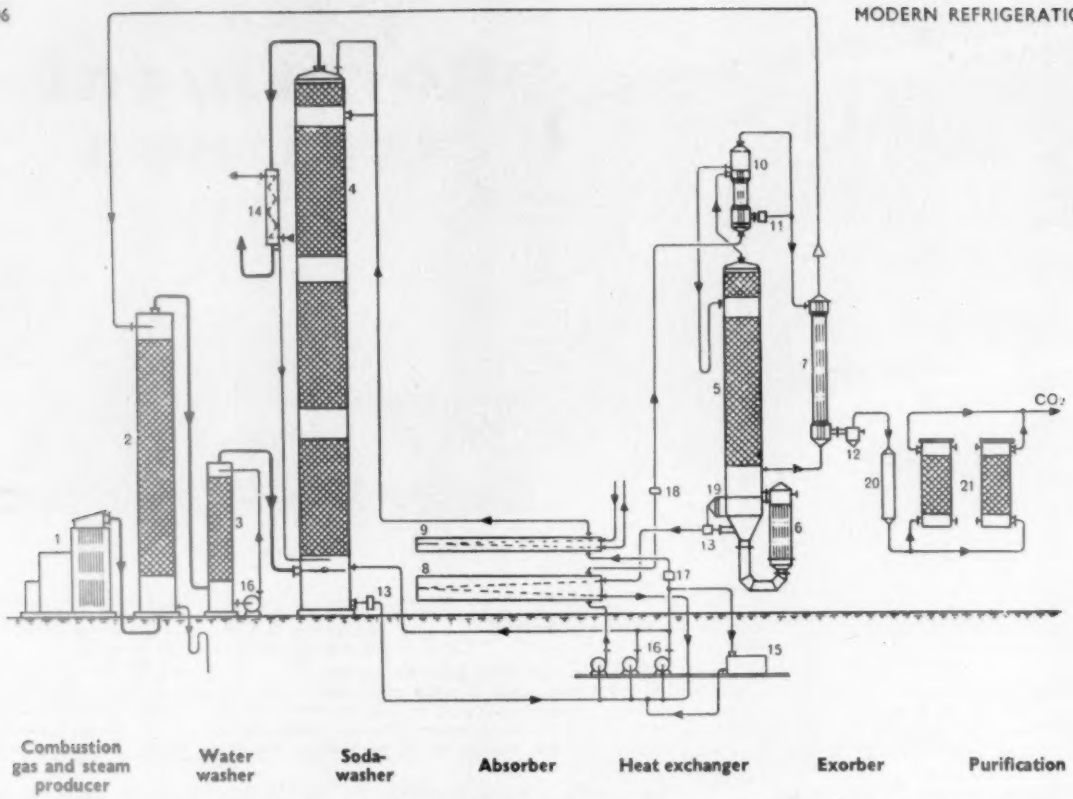


Fig. 3.—General layout of a plant for the production of CO_2 according to the alkacide process with special burners which operate with practically no excess of air. CO_2-content of the combustion gases 20 to 20.5 per cent.

1—Steam raiser; 2—Water washer; 3—Soda washer; 4—Alkacide washing tower; 5—Exorber; 6—Lye boiler; 7—Condenser; 8—Heat exchanger; 9—Cooler; 10—Preliminary gas extractor; 11—Separator; 12—Separator; 13—Sludge separator; 14—Combustion gas cooler; 15—Tank for lye leakage; 16—Pumps; 17—Diaphragm valve; 18—Flow meter; 19—Level regulator; 20—deep freezer; 21—A.C. filter.

developed a new CO_2 absorption process in collaboration with Pintsch-Bamag. This process uses an alkacide in place of the volatile monoethanolamine. The alkacide removes the carbon dioxide from the combustion gases in a single absorption column with a residue of only 0·05 to 0·3 per cent., depending on the size of the plant. Fig. 3 shows the general arrangement of an alkacide plant. For heating the boilers, special burners which operate with practically no excess of air, are chosen so that the combustion gases contain 20 to 20·5 per cent. CO_2. The alkacide lye absorbs considerably more CO_2 per litre than the potash lye so that less lye has to be circulated and heated. In such plants, approximately 2·5 to 2·8 kgs. of liquid carbon dioxide are obtained from one kilogramme of coke with a carbon content of 85 per cent. In the boilers, steam is raised for driving the compressor for liquefaction and for heating the lye. The combustion gases pass from the boiler into a washing column, in which they are washed by means of water, then into a washer with soda lye sprays where the sulphur dioxide is removed and finally into an absorption tower with alkacide sprays where the carbon dioxide is removed. The alkacide lye which is saturated with CO_2 is pumped through a heat exchanger in counter-current to the de-gassed lye to the exorption plant for the purpose of removing the CO_2. After it has given up its CO_2, the lye is returned to the absorption plant through the heat exchanger and a lye cooler.

The CO_2-gas, which is saturated with water vapour, is discharged from the top of the exorption plant and is passed through a cooler where the water vapour is condensed and returned to the lye. The cooled and largely dried CO_2-gas is de-odorized over an activated carbon filter.

It is worth mentioning the high purity of the carbon dioxide produced with the alkacide process. Exact determinations made at the Carba plant in Berne show a CO_2-content of 99·981 per cent. by volume, and oxygen content of 0·0026 per cent. by volume, the remainder being nitrogen. The same results are obtained if oil with at least 85 per cent. carbon is used in place of coke.

As the alkacide extracts practically all the carbon-dioxide from the combustion gases, the process is also suitable for producing CO_2 from low-carbon oils and methane.

Comparison of the raw material costs for the production of 10,000 tons of liquid carbon dioxide per year for an alkacide and for a good potash lye plant gives the following picture, assuming a yield of 2·5 kgs. CO_2 per kg. of coke for the alkacide plant and 2 kgs. CO_2 per kg.

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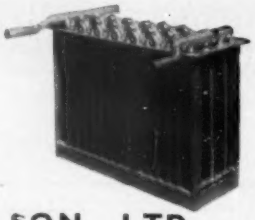

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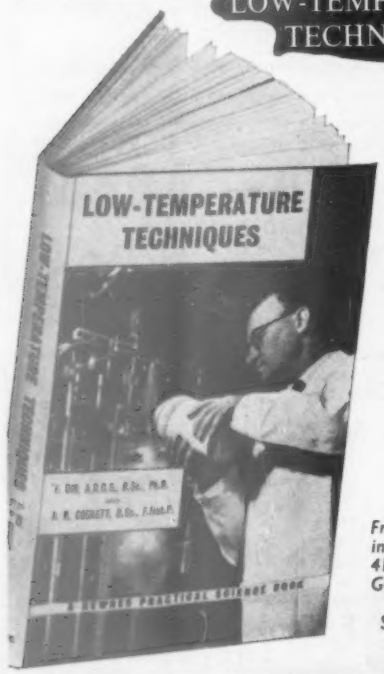

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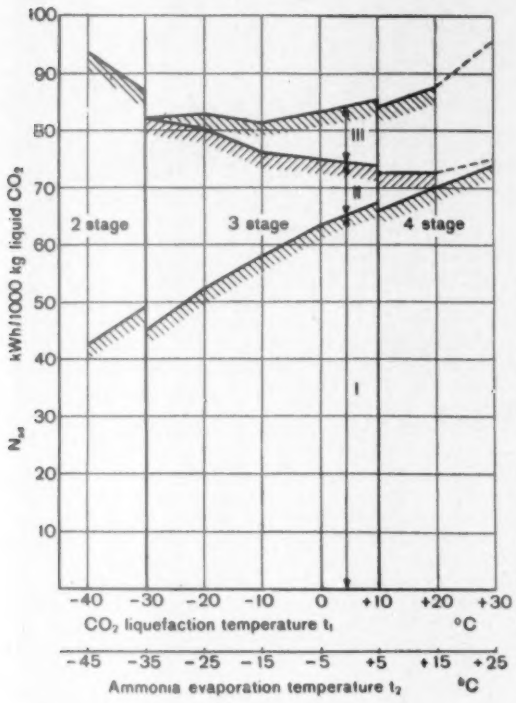

Fig. 4.
Power consumption with adiabatic compression for the liquefaction of CO_2 according to the liquefaction temperature of the CO_2 chosen and the evaporation temperature of the ammonia. I—Theoretical power consumption for compression of CO_2. II—Theoretical power consumption of the NH_3-compressor for liquefaction of CO_2 III—Theoretical power consumption for under-cooling the liquid CO_2 to —30° C.

of coke for the potash plant :

(*a*) Alkacide plant :

1. Coke consumption 4000 tons at Fr. 100.–	Fr. 400,000
2. Cooling water 1,600,000 m³ at Fr. –.05	Fr. 80,000
3. Alkacide 10,000 kgs. at Fr. 3.–	Fr. 30,000
Total	Fr. 510,000

(*b*) Potash plant :

1. Coke consumption 5,000 tons at Fr. 100.–	Fr. 500,000
2. Cooling water 2,000,000 m³ at Fr. –.05	Fr. 100,000
3. Potash 15,000 kgs. at Fr.–.85	Fr. 13,000
Total	Fr. 613,000

Steam boilers and ancillary equipment for the alkacide plant is about 25 per cent. smaller than for the potash plant. The alkacide plant of this size has only two absorption towers as against 12 of a potash plant. The alkacide plant has three lye circulating pumps for a total quantity of 75 m³/hr ; the potash plant has 13 lye pumps with a total capacity of 135 m³/hr. The ratio of the heat exchanger surfaces is approximately the same as the lye quantities, *i.e.* 75 : 135. The disadvantage of the alkacide plant compared with the potash plant lies in the fact that the carbon-dioxide must be deoderized by means of activited carbon.

The advantages of the alkacide plant are : (*a*) 15 to 20 per cent. greater economy ; (*b*) high purity of the carbon dioxide ; (*c*) ease of operation ; (*d*) low space requirements ; (*e*) short starting up period.

Liquefaction of Pure Carbon Dioxide

The gaseous, pure carbon dioxide is taken to the liquefaction plant. The critical point for carbon dioxide is at 31° C. and 75 atm. The temperature must, therefore, remain below 31° C.

(to be continued)

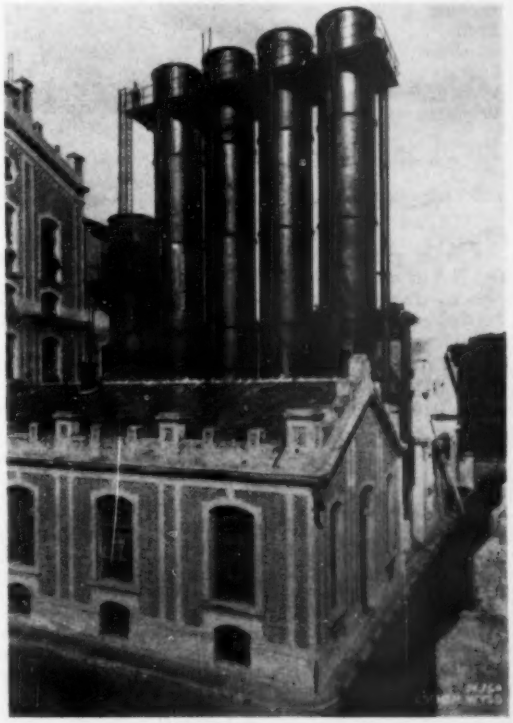

Fig. 5.
Absorption towers and washing tower of a carbon dioxide plant according to Fig. 2 which gives a maximum of 2 to 22 kgs. of liquid carbon dioxide per kg. of coke.

MILK COLLECTION IN SCOTLAND

DURING 1959, according to our Scottish correspondent, considerable progress has been made in the development of bulk collection of milk from farms. Group schemes are now in operation in the counties of Angus, Ayr, Fife, Kirkcudbright, Lanark, Stirling and Wigtown. To uplift the milk in the various schemes, eight private haulage contractors have provided road tankers, while the Milk Marketing Board have provided four.

The number of tanks installed and the number of producers who have made application to the Board to be included in an existing or projected bulk collection scheme, as at December 31, 1959 is given as follows :

County	Number of tanks installed	Number of applications	Total
Angus	15	16	31
Argyll	—	19	19
Ayr	26	32	58
Berwick ...	1*	—	1
Dumfries ...	—	77	77
Dunbarton ...	—	2	2
East Lothian ...	—	1	1
Fife	10	23	33
Kinross ...	—	15	15
Kirkcudbright...	41	55	96
Lanark ...	22	43	65
Mid Lothian	2*	9	11
Peebles ...	—	6	6
Perth	—	24	24
Renfrew ...	—	1	1
Stirling ...	18	1	19
West Lothian ...	—	2	2
Wigtown ...	31	52	83
	166	378	544

* Used for bulking and cooling before bottling.

Further group schemes which have been approved by the Board and the order in which they will come into operation are—Dumfriesshire No. 1 ; Angus Extension ; Perthshire No. 1 ; Kirkcudbright No. 3 ; Fife No. 2 (includes producers in Kinross) ; Wigtown No. 2 ; Lanarkshire No. 2 (includes producers in Mid Lothian and Peebles).

Vans for Meat Delivery

INSULATED, enclosed hygienic meat delivery vans used in the Dundee area for meat distribution to the retail trade have been withdrawn from operation because of uneconomic conditions arising from lack of retailer support. The position in the town was ventilated at the sitting of the Traffic Commissioners to hear an application from James Muir and Son, Dundee, for a " B " licence for two vehicles to carry meat and butchers' sundries.

Objection was lodged by J. Findlay & Co. (Contractors) Ltd., who pioneered insulated meat van traffic in this area. For the applicant, Mr. J. Hunter Sutherland said that the Dundee and District Master Butchers' Association with some 90 per cent. of local butchers as members received notice from United Carriers on November 4, that the J. Findlay & Co. insulated van service would be withdrawn as from December 1.

James Muir & Son offered to put on two vans and were granted a temporary licence ; they now sought full confirmation.

Mr. Thomas N. Craig, President of the Master Butchers Association gave evidence that they had had meetings with United Carriers on the use of the vehicles and rates. W. D. Connachie, representing J. Findlay & Co., said that in the various meetings it had been stressed that unless more support was forthcoming, rates would have to go up or the service be withdrawn. Mr. Craig agreed that this was so but that no matter how much the committee might support the use of insulated vans, they had no means of enforcing use of the vans on their members. He agreed that there was not 100 per cent. use by Dundee butchers of the service and that other methods of transport were being used.

Mr. Connachie claimed that the standard of delivery was inferior to that offered by the insulated vehicle and this was admitted, but with the additional point that the vehicles now in use had been approved by the authorities. Mr. Connachie thought the new food code would demand use of enclosed vans, but Mr. Craig said that the essential aspect was accepted by the sanitary authorities. After further discussion, Mr. Connachie withdrew J. Findlay & Co's., objection, accepting that there was a need for meat transport and they could not themselves economically operate their insulated vans.

Granting the application on a 6-mile radius Mr. Alex Robertson said " I think it is a retrograde step to cease using closed vans, but that is not a matter for me to decide.

"I am going to grant the licence, provided that the meat is carried in accordance with the regulations made by the local authority."

F.B.I. REGISTER OF BRITISH MANUFACTURERS—1960. 32nd Edition. 1,164 pp. Published for the Federation of British Industries. By KELLY'S DIRECTORIES LTD. and ILIFFE & SONS LTD. 42s. post free.

This well-known work which constitutes a comprehensive and accurate guide to a substantial cross section of British industry, contains lists of the products and services of over 7,500 member firms of the Federation of British Industries under more than 5,400 alphabetical headings.

In addition to the classified buyers' guide there are seven other sections in the register, giving addresses of companies and firms, and valuable information about trade associations, proprietary names, trade marks, etc. The French, German and Spanish glossaries give translations of every product term used in the main buyers' guide, each being numbered for easy reference between the English headings and their translations.

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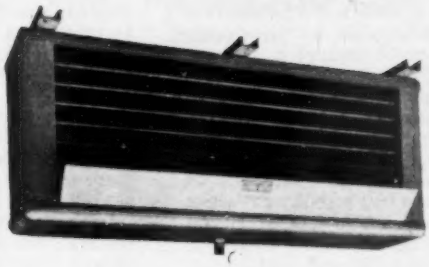
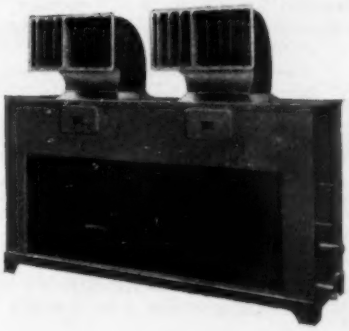




More Commercial News . . .

Teddington Refrigeration Controls combined forces with their London distributors **H.R.P. Limited** at the Refrigeration Exhibition in the metropolis last month. Their large stand gave excellent presentation of their products. Highlights of the Teddington stand were the new KCA Thinline thermostat and the RD expansion valve. The Teddington Thinline thermostat utilizes a well-tried seamless metallic bellows in conjunction with a heavy duty blade spring for reliability. All stresses from working components are supported by a main frame of stainless metal. Differential and range adjustment easily accessible. Switch mechanism embodying solid silver contacts and specially arranged to prevent moisture accumulation between live parts. Fully corrosion resistant construction. Instruments aged under tropical conditions to ensure permanent stability anywhere in the world. The RD expansion valve, also shown, has the advantage of being self-contained, and has no capiliary tube or phial. It cannot reverse under any conditions and, being limit-charged it affords a measure of protection to the motor starting in high ambient temperature, and has its opening point determined by the maximum charging pressure. The RD has wide application on evaporating temperatures from 50° F. down to –40° F., and is specially recommended for use on frozen-food cabinets, air-conditioning plant, and general low temperature work down to –40° F. It is available for " Freon-12 " and " Freon-22 " straight or cross-charged, and is ideal for distribution of refrigerant to multiple circuits. Other products displayed were : expansion valves, thermostatic and pressure operated switches and miscellaneous controls and accessories.

* * *

Texolag insulation protection, which has been introduced by **R. A. Brand & Co. Ltd.,** Letchworth, Hertfordshire, is a plastic coating system for preserving insulation materials on pipelines, storage tanks, reaction vessels and other types of process equipment. Several insulating materials tend to disintegrate if they are subject to mechanical damage, and those used on low temperature lines and vessels require to be protected from the penetration of condensed moisture which would freeze and force off the insulation material: in addition, chemical plant insulation may be exposed to spillage or leakage of chemicals. The materials and techniques of the Texolag system have therefore been designed for the protection of insulation where vapour sealing and resistance to solvents or corrosive atmosphere is required. Continuous pipelines and regularly shaped vessels may be protected by using Texolag base, which consists of fabric impregnated with a plastic composition and is wrapped round the insulation surface over a coat of sealing compound and then sealed with a special lacquer.

* * *

A new company, registered as **Prestcold Finance Ltd.,** has been formed to enable buyers of commercial equipment from Prestcold branches and subsidiary companies to enjoy special and direct hire purchase facilities. This development in Prestcold sales policy has been welcomed by the company's branches and subsidiary companies as it means also that Prestcold's hire purchase customers will now be subjected to a minimum of formalities.

Refrigeration Patents

These new refrigerating patents have been specially selected for readers by MODERN REFRIGERATION from the official " Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office.

APPLICATIONS RECEIVED

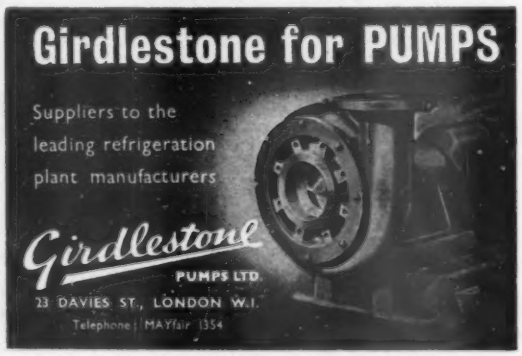
December 31—Stal Refrigeration A.B., C44463, Cold storage rooms.

January 1—Newman & Sons Ltd., W., and Barnes, E. T., P22, Refrigerated rooms etc. doors. 4—Associated Electrical Industries Ltd., Berry D. B. S., and Stickland, F. G. W., P231, Insulating materials. 5—Asquith, H. S., P309, Thermal insulation covering. 18—Air Control Installations Ltd., and Smith, A. W., P1741, Air-conditioning apparatus. 26—De Havilland Propellers Ltd., Groves, H. W., and Treganowan, B. E., P2749, Aircraft air-conditioning system. 29—Sulzer Freres, S. A., C3317, Air-conditioning. 30—Normalair Ltd., Leech, D. J., and Quick, D. F. J., P3389, Refrigeration system.

COMPLETE SPECIFICATIONS ACCEPTED

January 20—General Motors Corporation, 830,370, Ice block release arrangement. 27—Carrier Engineering Co., Ltd., 831,088, Air-conditioning apparatus ; Westinghouse Electric Corporation, 831,026, Gaskets for refrigeration apparatus or the like.

February 3—Hall & Kay Ltd., 831,495, Air-conditioning apparatus ; British Thermostat Co., Ltd., 831,556, Thermostatic controls for refrigerators ; Sulzer Freres, S.A., 831,613, Refrigeration apparatus ; Carrier Engineering Co. Ltd., 831,773, Air-conditioning control ; 831,587, Absorption refrigeration systems ; Soc. Francaise Autofrigor, 831,364, Refrigerated cabinets. 10—A.E.I. Hotpoint Ltd., formerly Hotpoint Electric Appliance Co. Ltd., 831,909, Refrigerator cabinets ; General Motors Corporation, 832,161, Refrigerators having sealed motor compressor units. 17—Carrier Engineering Co. Ltd., 832,792, Air-conditioning systems.



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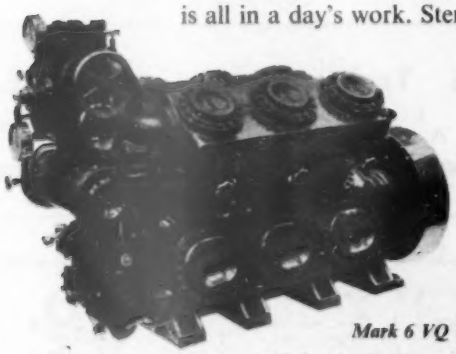

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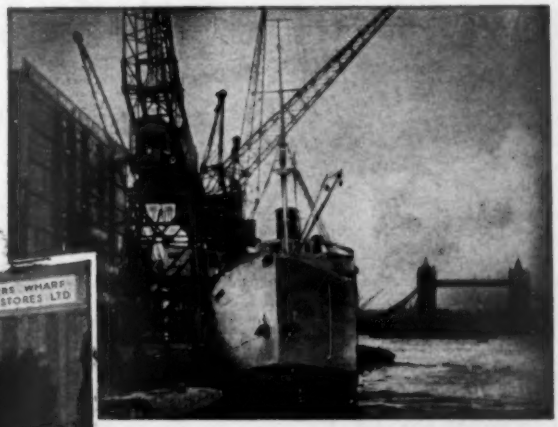

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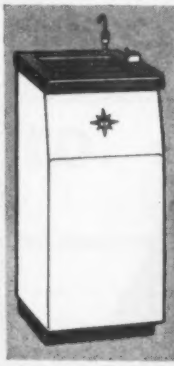

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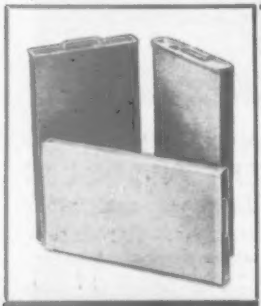

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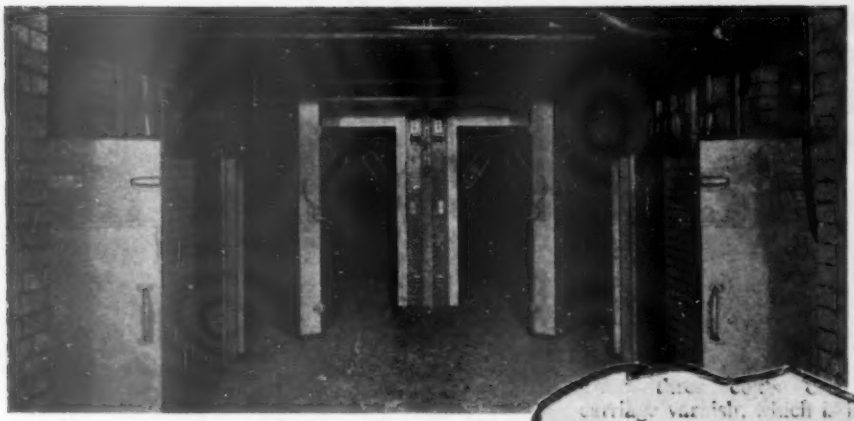

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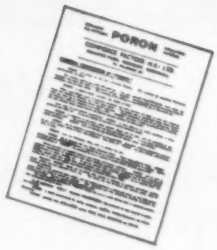

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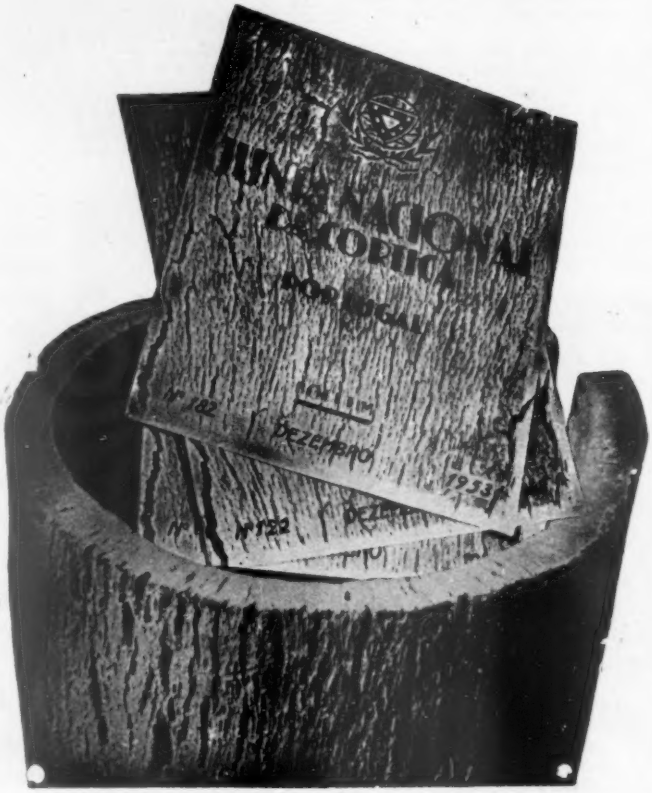

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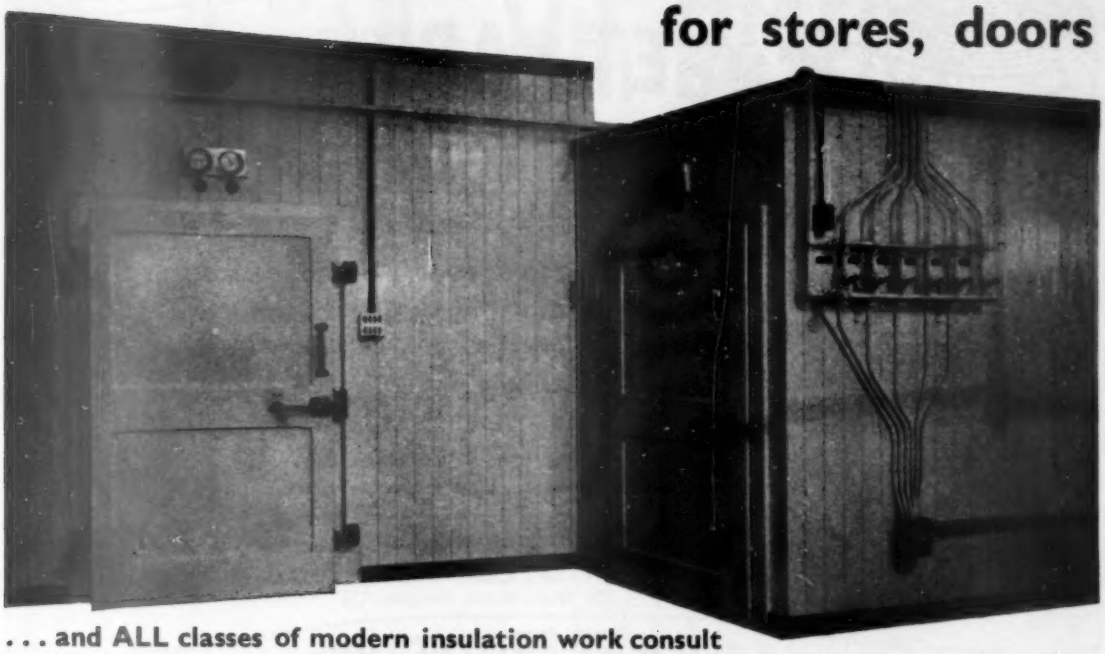

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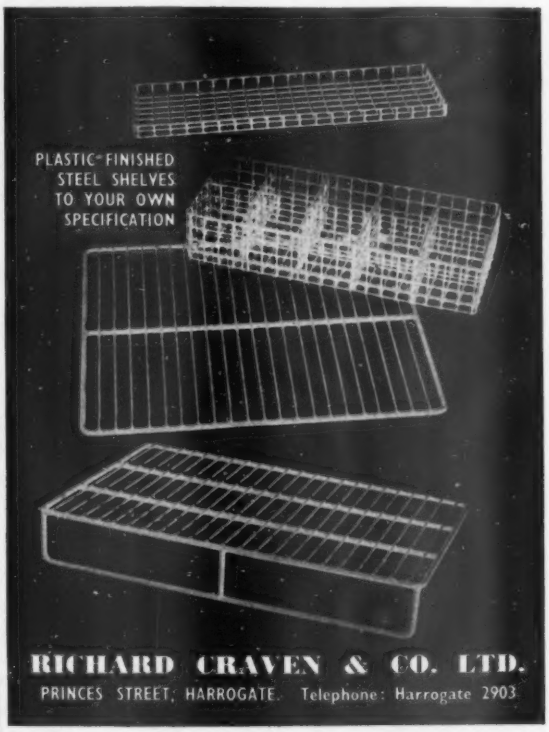

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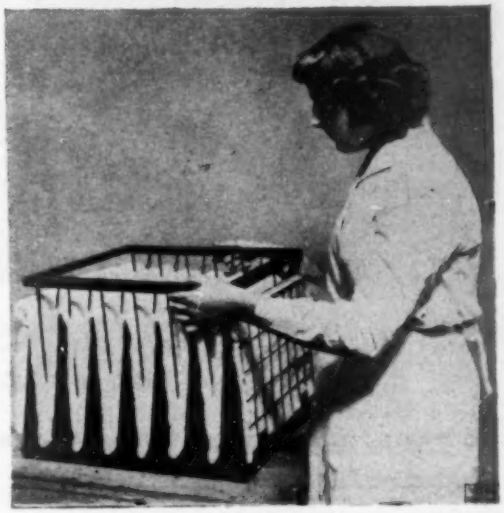

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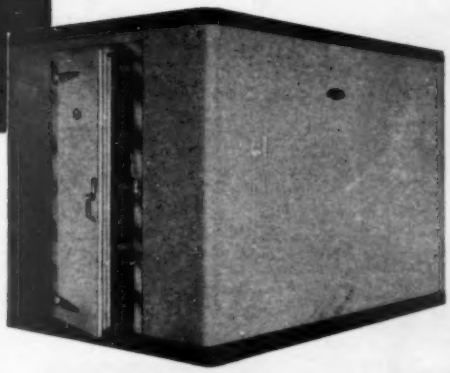

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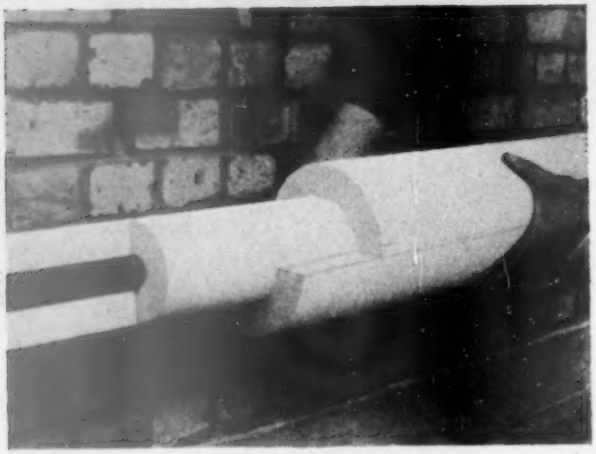

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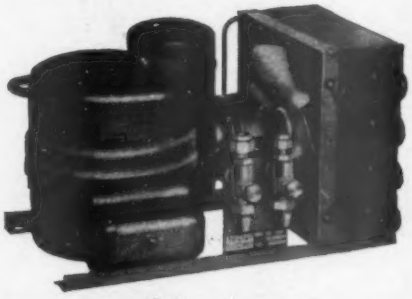

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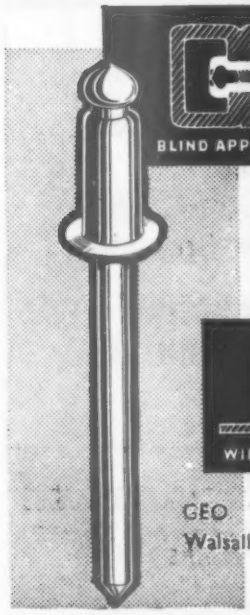

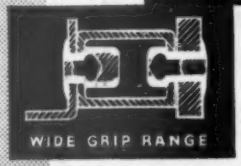

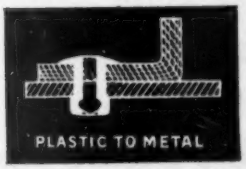

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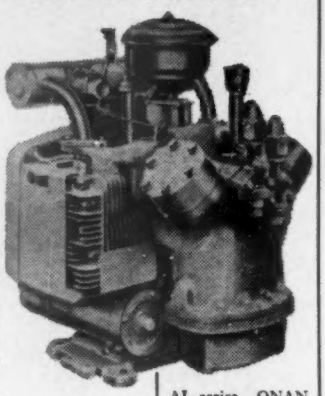

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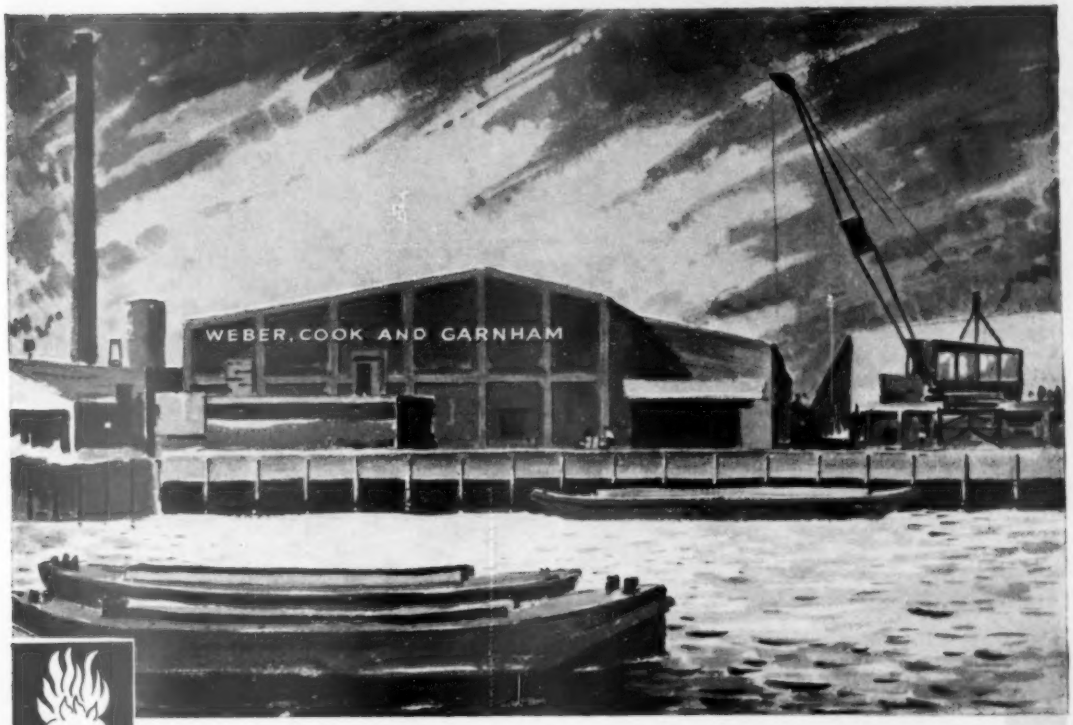
	PAGE
Abage (Fulham) Ltd.	250
AC-Delco	November
Aero Pipe & Glass Co. Ltd.	248
Air Control Installations Ltd. ...	307
Alpine Insulations Ltd.	326
Armstrong Patents Co. Ltd. ...	319
Associated Electrical Industries Ltd.	November
Aubanel & Alabaster Ltd.	February
Baxenden Chemical Co. Ltd. ...	254
Bennett (R. A.) & Co.	319
Bonallack & Sons Ltd.	January
Borthwick (Thos.) & Sons Ltd.	308 & 314
British Bitumen Emulsions Ltd.	304
British Railways	February
Bucknall (Henry) & Sons Ltd.	February
BX Plastics Ltd. ...	February
Cape Asbestos Co. Ltd....	December
Cassey (Walter) Ltd.	317
Chambers Wharf & Cold Stores Ltd.	315
City Electrical Co. ...	January
CLASSIFIED ADVERTISEMENTS	251, 252 & 253
Cole (E.K.) Ltd. ...	January
Commerce Factors (G. B.) Ltd.	318
Commercial Plastics (Sales) Ltd.	229
Consolidated Zinc Corporation Ltd.	226
Cork Growers Trading Co. (1931) Ltd.	January
Cork Insulation & Asbestos Co. Ltd.	February
Craven (Richard) & Co. Ltd. ...	322
Crompton Parkinson Ltd. ...	230
Danfoss Manufacturing Co.	Back Cover
Daniels (T. H. & J.) Ltd.	February
Dean & Wood (London) Ltd. ...	234
Dex Industries Ltd.	307
Distillers (The) Co. Ltd. ...	286
Distrene Ltd.	February
Douglas (Wm.) & Sons Ltd. ...	238
Dunham-Bush Ltd.	225
Dutton (Leonard) & Sons ...	318
Eastwood Mill Co. Ltd.	December
Elliott Bros. (London) Ltd.	February
Ellis & Co. (Refrigerators) Ltd.	November
Evomastics Ltd.	233
Expanded Rubber Co. Ltd.	February
Foamair Ltd.	February
Frigidaire	237
Frozt-ed-Aer Refrigerators ...	323
Fylde Ice & Cold Storage Co. Ltd.	316
Gill (H.) Stampings Ltd.	February
Girdlestone Pumps Ltd. ...	312
G.M. Power Plant Co. Ltd. ...	326
Great Grimsby Coal, Salt & Tanning Co. Ltd.	317
Hall (J. & E.) Ltd.	281
Hawker Siddeley (Hamble) Ltd.	242
Hay's Wharf Ltd.	314
Heath, Hicks & Perken (Thermometers) Ltd.	321
Heyde (J. Bennett) & Co. Ltd. ...	308
H.K.P. Ltd.	Cover ii
Hunt Heat Exchangers Ltd.	February
Hussmann British Refrigeration Ltd.	241
Ice Machinery Mart	308
Icemaster Ltd.	304
Imperial Aluminium Co. Ltd. ...	244
Imperial Chemical Industries Ltd. ("Arcton")	February
Imperial Chemical Industries Ltd. (Isocyanates)	February
Imperial Chemical Industries Ltd. (Metals)	February
Imperial Chemical Industries Ltd. (Plastics Division)	246
Industrial and Mining Supplies Co. Ltd.	February
Industrial Components Ltd. ...	322
Injection Moulders Ltd.	February
Insulated Bodies Ltd.	318
International Cold Storage & Ice Co. Ltd.	January
Jackstone Froster Ltd.	Front cover & 307
"J.D." Insulating Co. Ltd. ...	291
J.C.P. Industrial Clothing Ltd.	February
J. R. Enterprises Ltd. ...	February
Junta Nacional Da Cortica ...	320
K.D.G. Instruments Ltd.	December
Keenan (Matthew) & Co. Ltd.	February
Kelvinator Ltd.	282
Lec Refrigeration Ltd.	223
Lightfoot Refrigeration Co. Ltd.	296
Lister (R. A.) & Co. Ltd.	January
Loheat Ltd.	322
London Fan & Motor Co. Ltd.	December
Magnetic Valve Co. Ltd.	November
Mann Egerton & Co. Ltd.	January
McNeill (F.) & Co. Ltd.	November
Mercantile Credit Co. Ltd. ...	285
Miller (Arthur) Ltd. ...	February
Minikay Ltd.	222
MODERN REFRIGERATION ...	249
Monsanto Chemicals Ltd. ...	299
Nathan's Equipment Ltd. ...	316
Negretti & Zambra Ltd....	February
Newalls Insulation Co. Ltd. ...	231
Newnes (George) Ltd. ...	308
Notley Ltd.	307
Patrick (W.) & Son Ltd. ...	318
Perfection Parts Ltd. ...	November
Pertwee & Back Ltd.	307
Pilot Refrigerated Installations	January
Porter (Alfred) & Co. Ltd. ...	227
Pressed Steel Co. Ltd.	289
Ranco Ltd.	239
Rapid-Ice-Freezing Ltd. ...	308
"Refrigerating Engineering"	November
Refrigeration Appliances Ltd.	February
Refrigeration Spares Ltd.	December
"Retrigeration Journal" The	December
Refrigerator Components Ltd. ...	326
Regwell Ltd.	November
Richards Cork & Insulation Products Ltd.	324
Robinson Bros. Cork Growers Ltd.	February
Scott (David) & Co. Ltd. ...	327
Searle Manufacturing Co. Ltd....	311
Secura Refrigerated Cabinet Co.	240
Sharp & Law Ltd. ...	February
Shell Chemical Co. Ltd. ...	245
Siebe, Gorman & Co. Ltd. ...	325
Silica Gel Ltd.	January
Smith's Insulation Ltd. ...	Cover iii
Smithfield Refrigerator Co.	February
S. & R. Electronic Products Ltd.	326
S.N. Engineering Co. Ltd. ...	316
Spiral Tube & Components Co. Ltd.	248
Spiro Gills Ltd.	221
Stempel-Hermetik Gmbh. ...	324
Sterne (L.) & Co. Ltd.	313
Styrene Products Ltd. ...	December
Tabor (George) Ltd.	308
Taylor (W. A.) Ltd.	303
Teddington Refrigeration Controls Ltd.	235
Temperature Ltd. ...	243 & 307
Tucker (Geo.) Eyelet Co. Ltd. ...	325
U.D. Engineering Co. Ltd. ...	247
Union Carbide Ltd. ...	February
Union Cold Storage Co. Ltd. ...	315
L'Unite Hermetique	236
United Air Coil Ltd. ...	January
United Carlo Gatti, Stevenson & Slaters Ltd.	February
United Dominions Trust (Commercial) Ltd.	295
Visco Engineering Co. Ltd. ...	323
Wallington Jones & Co. Ltd. ...	321
Wensley (Chas.) & Sons Ltd.	January
West (Ernest) & Beynon Ltd.	February
West (W. Van) & Zonen ...	316
Western Detail Manufacturers Ltd.	232
Western Ice & Cold Storage Co. Ltd., The	216
Westool Ltd.	November
Whitaker (C. L.) & Co. Ltd.	February
White (J. Samuel) & Co. Ltd.	228
Wigglesworth (Frank) & Co. Ltd.	307
Williams (G.) Engineering Co. Ltd.	292
Winget Ltd.	254
Winn & Son Ltd.	308
Wood, L. D. (Eldwood) Ltd. ...	300
Worthington-Simpson Ltd.	November
York Shipley Ltd.	224
Yorkshire Imperial Metals Ltd.	February
Zero Electric Ltd.	327

Another large cold storage project takes shape

Smiths Insulations were chosen by Messrs. Weber, Cook & Garnham as designers and main contractors for their new 210,000 cu. ft. cold store at Maconochies Wharf, Millwall. This tremendous new store called for careful planning and co-ordination, quick and efficient handling of the meat being stored, and the envelope principle of insulation for maximum thermal efficiency and economical operating costs. Who better could they choose to meet these requirements than Smiths—the pace-setters in modern cold store design and construction?

An artists impression of the completed store.

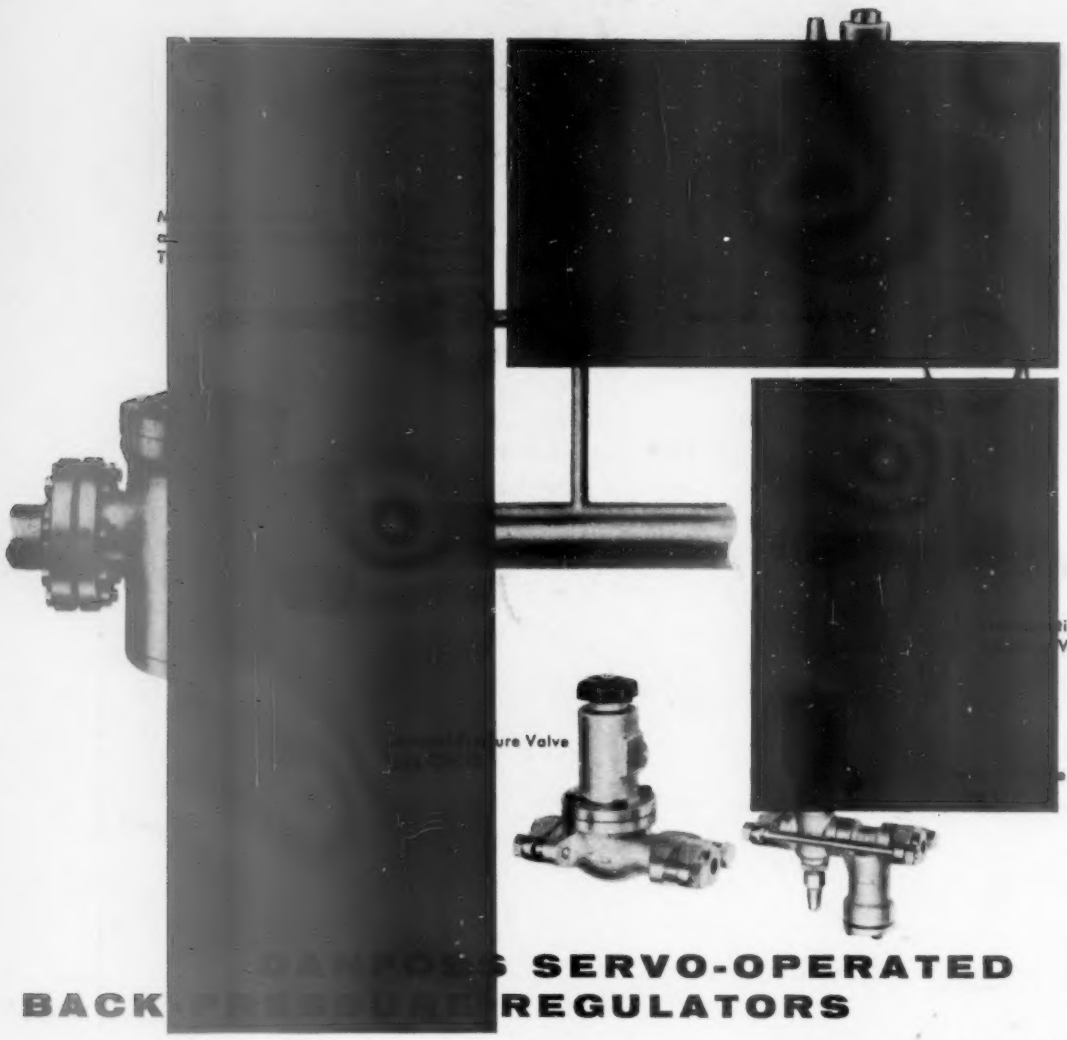


Smiths have many large cold stores in hand with more being planned.
Consult our Design Engineers about your future projects without any obligation.

Smiths Insulations Ltd.

Est. 1874 Burton-on-Trent Tel: 2061/2

London Office: 105 Empire House, St. Martins-le-Grand, E.C.1. Tel: MONarch 2000



ic
Valve Type TSA 10

ure Valve

SERVO-OPERATED
REGULATORS

. . . . . are always made in two parts in order to make them as universal as possible—a main valve and a pilot valve, the latter being inserted in an equalising line between the suction line from the evaporator and the top of the main valve.

As the main valve may be governed simultaneously by several pilot valves mounted in the same pressure equalising line, the combination can simultaneously control:

Constant evaporating temperature,
Constant air temperature,
Constant brine temperature.

if the pilot valve used is of the Type EVSP the main valve will act as a solenoid valve.

Danfoss

everything under Danfoss control

OLS AND EQUIPMENT

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